

7.5.1 Set up libraries

```
#Load Libraries
library(datasets)
library(ggplot2)

## Warning in register(): Can't find generic `scale_type` in package ggplot2 to
## register S3 method.

library(multcompView)
library(dplyr)

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

library(ggpubr)
library(tidyverse)

## — Attaching packages ————— tidyverse 1.3.1 —

## ✓ tibble 3.1.6      ✓ purrr 0.3.4
## ✓ tidyr 1.1.4      ✓ stringr 1.4.0
## ✓ readr 2.1.1      ✓ forcats 0.5.1

## — Conflicts ————— tidyverse_conflicts() —
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

library(rmarkdown)
library(knitr)
knitr::opts_chunk$set(
  echo = TRUE,
  message = TRUE,
  warning = TRUE
)
```

7.5.2 Peptide digests: set up

```
#Load data
PeptideDigest <- read.csv("~/Documents/R/Ch3PeptideDigest.csv")
PeptideDigest$Sample <- as.factor(PeptideDigest$Sample)
PeptideDigest$Quantity.Digested <- as.factor(PeptideDigest$Quantity.Digested)
PeptideDigest$Fraction <- as.factor(PeptideDigest$Fraction)
print(PeptideDigest)

##   Sample Fraction Quantity.Digested PeptidesRecoveredµg
## 1      1      100R             15 µg             14.34
## 2      1         1             15 µg             14.44
## 3      1         2      3.00E+09             15.02
## 4      1         3      3.00E+09             14.18
## 5      1         4      3.00E+09             13.12
## 6      1         5      3.00E+09             13.97
## 7      1      qEV      3.00E+09             14.04
## 8      2      100R             15 µg             15.54
## 9      2         1             15 µg             14.27
## 10     2         2      1.50E+09             13.85
## 11     2         3      1.50E+09             14.12
## 12     2         4      1.50E+09             14.17
```

## 13	2	5	1.50E+09	13.44
## 14	2	qEV	1.50E+09	13.08
## 15	3	100R	15 µg	17.95
## 16	3	1	15 µg	15.41
## 17	3	2	3.00E+09	16.24
## 18	3	3	3.00E+09	15.95

7.5.3 Peptide digests: assess univariate normality

```
hist(PeptideDigest$PeptidesRecoveredµg, main = "Peptides Recovered Histogram", xlab = "Total Peptides (µg)
")
qqnorm(PeptideDigest$PeptidesRecoveredµg, main = "Peptides Recovered QQ Plot", xlab = "Total Peptides (µg)
")
qqline(PeptideDigest$PeptidesRecoveredµg)

shapiro.test(PeptideDigest$PeptidesRecoveredµg)

##
## Shapiro-Wilk normality test
##
## data: PeptideDigest$PeptidesRecoveredµg
## W = 0.89345, p-value = 0.04423
```

The data is not normally distributed so non-parametric Kruskal-Wallis and Wilcoxon signed-rank tests will be used.

7.5.4 Peptide digests: assess differences in peptide recovery by sample (Figure 3.7)

```
kruskal.test(PeptidesRecoveredµg ~ Sample, data = PeptideDigest)

##
## Kruskal-Wallis rank sum test
##
## data: PeptidesRecoveredµg by Sample
## Kruskal-Wallis chi-squared = 8.4724, df = 2, p-value = 0.01446

pairwise.wilcox.test(PeptideDigest$PeptidesRecoveredµg, PeptideDigest$Sample,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: PeptideDigest$PeptidesRecoveredµg and PeptideDigest$Sample
##
## 1 2
## 2 0.535 -
## 3 0.018 0.018
##
## P value adjustment method: BH
```

There is a significant difference in peptide recovery between samples 1&3 and 2&3.

```
comparisons_peptidessample <- list( c("1", "3"), c("2", "3"))
ggplot(PeptideDigest, aes(Sample, PeptidesRecoveredµg))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Total Peptides (µg)") +
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20) )+
  stat_compare_means(comparisons = comparisons_peptidessample, label = "p.signif") +
  stat_compare_means(label.y = 19, size = 6)
```

7.5.5 Peptide digests: assess differences in peptide recovery by input (Figure 3.7)

```
str(PeptideDigest)

## 'data.frame': 18 obs. of 4 variables:
## $ Sample : Factor w/ 3 levels "1","2","3": 1 1 1 1 1 1 1 2 2 2 ...
## $ Fraction : Factor w/ 7 levels "1","100R","2",...: 2 1 3 4 5 6 7 2 1 3 ...
## $ Quantity.Digested : Factor w/ 3 levels "1.50E+09","15 µg",...: 2 2 3 3 3 3 3 2 2 1 ...
## $ PeptidesRecoveredµg: num 14.3 14.4 15 14.2 13.1 ...

kruskal.test(PeptidesRecoveredµg ~ Quantity.Digested, data = PeptideDigest)

##
## Kruskal-Wallis rank sum test
##
## data: PeptidesRecoveredµg by Quantity.Digested
## Kruskal-Wallis chi-squared = 7.3171, df = 2, p-value = 0.02577

pairwise.wilcox.test(PeptideDigest$PeptidesRecoveredµg, PeptideDigest$Quantity.Digested,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: PeptideDigest$PeptidesRecoveredµg and PeptideDigest$Quantity.Digested
##
## 1.50E+09 15 µg
## 15 µg 0.013 -
## 3.00E+09 0.223 0.295
##
## P value adjustment method: BH
```

There is no significant difference in peptide recovery between starting materials.

```
ggplot(PeptideDigest, aes(Quantity.Digested, PeptidesRecoveredµg))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x="Quantity Digested", y="Total Peptides (µg)") +
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  stat_compare_means(label.y = 19, size = 6)
```

7.5.6 Individual LC-MS/MS injections: load and set up data

```
#Scaffold settings: Protein Threshold 99%, Min # Peptides 2, Peptide Threshold 0.1%FDR
#View low scoring matches NOT CHECKED
#Individual Injections: 779 Proteins at 99.0% Minimum 2 Min # Peptides 1.8% Decoy FDR
#395494 Spectra at 95% Minimum 0.10% Decoy FDR
IndInjStats <- read.csv("~/Documents/R/2.17.22IndInjStat.csv")
#change BioSample to factor instead of integer
IndInjStats$BioSample <- as.factor(IndInjStats$BioSample)
#view data structure
view(IndInjStats)
str(IndInjStats)

## 'data.frame': 63 obs. of 9 variables:
## $ Injection.Order: int 4 27 55 15 28 48 12 29 44 9 ...
## $ BioSample : Factor w/ 3 levels "1","2","3": 1 1 1 1 1 1 1 1 1 1 ...
## $ Fraction : chr "100R" "100R" "100R" "F1" ...
## $ Injection : int 1 2 3 1 2 3 1 2 3 1 ...
## $ Protein : int 477 464 450 456 444 443 480 458 455 331 ...
## $ IDs : int 10706 10453 10157 10568 10629 10336 10214 9850 9805 5813 ...
## $ Spectra : int 38248 38983 39100 38704 39489 38701 37052 35760 36937 30894 ...
```

```
## $ X.IDs      : num  0.28 0.268 0.26 0.273 0.269 ...
## $ PercentIDs : num  28 26.8 26 27.3 26.9 ...
```

```
print(IndInjStats)
```

##	Injection.Order	BioSample	Fraction	Injection	Protein	IDs	Spectra
## 1	4	1	100R	1	477	10706	38248
## 2	27	1	100R	2	464	10453	38983
## 3	55	1	100R	3	450	10157	39100
## 4	15	1	F1	1	456	10568	38704
## 5	28	1	F1	2	444	10629	39489
## 6	48	1	F1	3	443	10336	38701
## 7	12	1	F2	1	480	10214	37052
## 8	29	1	F2	2	458	9850	35760
## 9	44	1	F2	3	455	9805	36937
## 10	9	1	F3	1	331	5813	30894
## 11	23	1	F3	2	304	5152	30304
## 12	58	1	F3	3	309	5272	31731
## 13	5	1	F4	1	271	4618	28873
## 14	25	1	F4	2	199	4111	26218
## 15	47	1	F4	3	191	3661	27409
## 16	20	1	F5	1	143	2639	23769
## 17	30	1	F5	2	171	4215	27309
## 18	62	1	F5	3	152	3825	25347
## 19	17	1	qEV	1	234	4146	27641
## 20	33	1	qEV	2	194	4129	26474
## 21	59	1	qEV	3	191	3163	25403
## 22	13	2	100R	1	373	9734	38532
## 23	37	2	100R	2	365	9588	38326
## 24	61	2	100R	3	359	9323	37807
## 25	2	2	F1	1	340	9048	37926
## 26	24	2	F1	2	323	8715	38468
## 27	54	2	F1	3	326	8430	38690
## 28	14	2	F2	1	322	7236	33576
## 29	42	2	F2	2	289	6849	32939
## 30	45	2	F2	3	293	6671	31949
## 31	8	2	F3	1	279	5158	30521
## 32	40	2	F3	2	241	5050	31529
## 33	52	2	F3	3	242	5018	31965
## 34	18	2	F4	1	224	4810	30113
## 35	34	2	F4	2	206	4412	29205
## 36	57	2	F4	3	204	4253	29157
## 37	19	2	F5	1	171	3577	24484
## 38	26	2	F5	2	172	3822	25349
## 39	43	2	F5	3	176	3423	24592
## 40	3	2	qEV	1	348	6391	31909
## 41	41	2	qEV	2	289	5296	30122
## 42	51	2	qEV	3	302	5721	31290
## 43	7	3	100R	1	328	8403	37442
## 44	35	3	100R	2	317	8513	37738
## 45	63	3	100R	3	313	8045	36289
## 46	16	3	F1	1	305	8294	37695
## 47	38	3	F1	2	287	8282	37803
## 48	50	3	F1	3	298	7858	37421
## 49	1	3	F2	1	289	6681	33969
## 50	32	3	F2	2	277	7260	34733
## 51	53	3	F2	3	274	6882	34559
## 52	21	3	F3	1	227	4514	29332
## 53	36	3	F3	2	222	4531	29282
## 54	46	3	F3	3	217	4876	30615
## 55	11	3	F4	1	99	1649	21216
## 56	60	3	F4	2	84	1354	21201
## 57	22	3	F4	3	98	1914	23160
## 58	6	3	F5	1	98	1799	21045
## 59	31	3	F5	2	82	2031	23249
## 60	49	3	F5	3	122	3109	26969
## 61	10	3	qEV	1	215	3282	25879
## 62	39	3	qEV	2	200	4089	28764
## 63	56	3	qEV	3	203	4077	28895

##	X.IDs	PercentIDs
## 1	0.27991006	27.991006
## 2	0.26814252	26.814252
## 3	0.25976983	25.976983
## 4	0.27304670	27.304670
## 5	0.26916358	26.916358
## 6	0.26707320	26.707320
## 7	0.27566662	27.566662
## 8	0.27544743	27.544743
## 9	0.26545200	26.545200
## 10	0.18815951	18.815951
## 11	0.17001057	17.001057
## 12	0.16614667	16.614667
## 13	0.15994180	15.994180
## 14	0.15680067	15.680067
## 15	0.13356927	13.356927
## 16	0.11102697	11.102697
## 17	0.15434472	15.434472
## 18	0.15090543	15.090543
## 19	0.14999457	14.999457
## 20	0.15596434	15.596434
## 21	0.12451285	12.451285
## 22	0.25262120	25.262120
## 23	0.25016960	25.016960
## 24	0.24659455	24.659455
## 25	0.23856984	23.856984
## 26	0.22655194	22.655194
## 27	0.21788576	21.788576
## 28	0.21551108	21.551108
## 29	0.20792980	20.792980
## 30	0.20880152	20.880152
## 31	0.16899839	16.899839
## 32	0.16017000	16.017000
## 33	0.15698420	15.698420
## 34	0.15973167	15.973167
## 35	0.15107003	15.107003
## 36	0.14586549	14.586549
## 37	0.14609541	14.609541
## 38	0.15077518	15.077518
## 39	0.13919161	13.919161
## 40	0.20028833	20.028833
## 41	0.17581834	17.581834
## 42	0.18283796	18.283796
## 43	0.22442712	22.442712
## 44	0.22558165	22.558165
## 45	0.22169252	22.169252
## 46	0.22002918	22.002918
## 47	0.21908315	21.908315
## 48	0.20998904	20.998904
## 49	0.19667932	19.667932
## 50	0.20902312	20.902312
## 51	0.19913770	19.913770
## 52	0.15389335	15.389335
## 53	0.15473670	15.473670
## 54	0.15926833	15.926833
## 55	0.07772436	7.772436
## 56	0.06386491	6.386491
## 57	0.08264249	8.264249
## 58	0.08548349	8.548349
## 59	0.08735859	8.735859
## 60	0.11528051	11.528051
## 61	0.12682098	12.682098
## 62	0.14215687	14.215687
## 63	0.14109707	14.109707

7.5.7 Individual LC-MS/MS injections: scatter plots of injection order statistics (Figure 7.2)

```

#Number of proteins by injection order
ggplot(IndInjStats, aes(x = Injection.Order, y = Protein, color = BioSample))+
  geom_point(size = 3)+
  theme_classic()+
  labs(x = "Injection Order", y = "Number of Proteins", col = "Sample")+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))

#Number of spectra by injection order
ggplot(IndInjStats, aes(x = Injection.Order, y = Spectra, color = BioSample))+
  geom_point(size = 3)+
  theme_classic()+
  labs(x = "Injection Order", y = "Number of Spectra", col = "Sample")+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))

#Spectral IDs by injection order
ggplot(IndInjStats, aes(x = Injection.Order, y = IDs, color = BioSample))+
  geom_point(size = 3)+
  theme_classic()+
  labs(x = "Injection Order", y = "Number of Spectral IDs", col = "Sample")+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))

#Percent IDs by injection order
ggplot(IndInjStats, aes(x = Injection.Order, y = PercentIDs, color = BioSample))+
  geom_point(size = 3)+
  theme_classic()+
  labs(x = "Injection Order", y = "Percent of Spectra Identified", col = "Sample")+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))

```

7.5.8 Individual LC-MS/MS injections: normality testing for individual injection statistics (Figure 7.3)

```

#assess univariate normality
attach(IndInjStats)
hist(Protein, main = "Number of Proteins Histogram")

qqnorm(Protein, main = "Number of Proteins QQ Plot")
qqline(Protein)

hist(IDs, main = "Number of Spectral IDs Histogram")

qqnorm(IDs, main = "Number of Spectral IDs QQ Plot")
qqline(IDs)

hist(Spectra, main = "Number of Spectra Histogram")

qqnorm(Spectra, main = "Number of Spectra QQ Plot")
qqline(Spectra)

```

```

hist(PercentIDs, main = "Percent of Spectra Identified Histogram")

qqnorm(PercentIDs, main = "Percent of Spectra Identified QQ Plot")
qqline(PercentIDs)

df <- data.frame(IndInjStats$Protein, IndInjStats$IDs,
                 IndInjStats$Spectra, IndInjStats$PercentIDs)
lshap <- lapply(df, shapiro.test)
lres <- sapply(lshap, '[', c("statistic", "p.value"))
lres

##           IndInjStats.Protein IndInjStats.IDs IndInjStats.Spectra
## statistic 0.9631344          0.9418334      0.935744
## p.value   0.05623937        0.005042804      0.002650974
##           IndInjStats.PercentIDs
## statistic 0.9634227
## p.value   0.05818734

```

Based on plots and Shapiro Wilks test, protein and percent IDs are normally distributed.

7.5.9 Individual LC-MS/MS injections: evaluate for equal variance

```

bartlett.test(Protein ~ BioSample, data = IndInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: Protein by BioSample
## Bartlett's K-squared = 8.578, df = 2, p-value = 0.01372

bartlett.test(Protein ~ Fraction, data = IndInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: Protein by Fraction
## Bartlett's K-squared = 7.9834, df = 6, p-value = 0.2393

bartlett.test(PercentIDs ~ BioSample, data = IndInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: PercentIDs by BioSample
## Bartlett's K-squared = 4.5124, df = 2, p-value = 0.1047

bartlett.test(PercentIDs ~ Fraction, data = IndInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: PercentIDs by Fraction
## Bartlett's K-squared = 12.404, df = 6, p-value = 0.05355

```

Percent IDs has equal variance by BioSample and Fraction, Protein has equal variance by fraction only.

7.5.10 Individual LC-MS/MS injections: compare means for individual injection statistics

ANOVA can be used for Protein by Fraction and PercentIDs. Kruskal-Wallis should be used for Protein by BioSample, Spectra, and IDs.

```

proteinanova <- aov(Protein ~ Fraction, data = IndInjStats)
summary(proteinanova)

```

```
##           Df Sum Sq Mean Sq F value    Pr(>F)
## Fraction      6 472995    78832    20.22 2.02e-12 ***
## Residuals    56 218288     3898
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

proteintukey <- TukeyHSD(proteinanova)
print(proteintukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = Protein ~ Fraction, data = IndInjStats)
##
## $Fraction
##           diff           lwr           upr           p adj
## F1-100R    -24.888889 -114.891070    65.113292 0.9788134
## F2-100R    -34.333333 -124.335514    55.668848 0.9035898
## F3-100R   -119.333333 -209.335514   -29.331152 0.0028291
## F4-100R   -207.777778 -297.779959 -117.775597 0.0000001
## F5-100R   -239.888889 -329.891070 -149.886708 0.0000000
## qEV-100R -141.111111 -231.113292  -51.108930 0.0002407
## F2-F1       -9.444444  -99.446626    80.557737 0.9999039
## F3-F1      -94.444444 -184.446626   -4.442263 0.0337924
## F4-F1     -182.888889 -272.891070  -92.886708 0.0000014
## F5-F1     -215.000000 -305.002181 -124.997819 0.0000000
## qEV-F1     -116.222222 -206.224403  -26.220041 0.0039458
## F3-F2      -85.000000 -175.002181    5.002181 0.0760108
## F4-F2     -173.444444 -263.446626  -83.442263 0.0000046
## F5-F2     -205.555556 -295.557737 -115.553374 0.0000001
## qEV-F2     -106.777778 -196.779959  -16.775597 0.0104427
## F4-F3      -88.444444 -178.446626    1.557737 0.0571156
## F5-F3     -120.555556 -210.557737  -30.553374 0.0024788
## qEV-F3     -21.777778 -111.779959    68.224403 0.9893640
## F5-F4      -32.111111 -122.113292    57.891070 0.9281822
## qEV-F4      66.666667  -23.335514   156.668848 0.2790204
## qEV-F5      98.777778    8.775597   188.779959 0.0226785

anova <- aov(PercentIDs ~ BioSample, data = IndInjStats)
summary(anova)

##           Df Sum Sq Mean Sq F value    Pr(>F)
## BioSample      2  224.9   112.46    3.949 0.0245 *
## Residuals    60 1708.4    28.47
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(anova)
print(tukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = PercentIDs ~ BioSample, data = IndInjStats)
##
## $BioSample
##           diff           lwr           upr           p adj
## 2-1  -1.202797 -5.160307    2.7547129 0.7464980
## 3-1  -4.471804 -8.429314  -0.5142940 0.0231378
## 3-2  -3.269007 -7.226517    0.6885032 0.1246690

fractionanova <- aov(PercentIDs ~ Fraction, data = IndInjStats)
summary(fractionanova)

##           Df Sum Sq Mean Sq F value    Pr(>F)
## Fraction      6 1511.6   251.93    33.45 <2e-16 ***
## Residuals    56  421.7     7.53
```



```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

fractiontukey <- TukeyHSD(fractionanova)
print(fractiontukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = PercentIDs ~ Fraction, data = IndInjStats)
##
## $Fraction
##          diff          lwr          upr          p adj
## F1-100R -0.9724073 -4.9284874  2.98367276 0.9884495
## F2-100R -1.9473384 -5.9034185  2.00874165 0.7405095
## F3-100R -8.3393481 -12.2954282 -4.38326801 0.0000006
## F4-100R -12.1966484 -16.1527285 -8.24056835 0.0000000
## F5-100R -12.0938571 -16.0499372 -8.13777702 0.0000000
## qEV-100R -9.2157527 -13.1718328 -5.25967257 0.0000000
## F2-F1 -0.9749311 -4.9310112  2.98114899 0.9882916
## F3-F1 -7.3669408 -11.3230209 -3.41086068 0.0000096
## F4-F1 -11.2242411 -15.1803212 -7.26816101 0.0000000
## F5-F1 -11.1214498 -15.0775299 -7.16536969 0.0000000
## qEV-F1 -8.2433453 -12.1994254 -4.28726524 0.0000008
## F3-F2 -6.3920097 -10.3480898 -2.43592957 0.0001444
## F4-F2 -10.2493100 -14.2053901 -6.29322990 0.0000000
## F5-F2 -10.1465187 -14.1025988 -6.19043858 0.0000000
## qEV-F2 -7.2684142 -11.2244943 -3.31233412 0.0000127
## F4-F3 -3.8573003 -7.8133804  0.09877976 0.0605355
## F5-F3 -3.7545090 -7.7105891  0.20157109 0.0734760
## qEV-F3 -0.8764046 -4.8324847  3.07967554 0.9933488
## F5-F4  0.1027913 -3.8532888  4.05887142 1.0000000
## qEV-F4  2.9808958 -0.9751843  6.93697588 0.2602964
## qEV-F5  2.8781045 -1.0779756  6.83418455 0.2992426

#Kruskal-Wallis with

kruskal.test(Protein ~ BioSample, data = IndInjStats)

##
## Kruskal-Wallis rank sum test
##
## data: Protein by BioSample
## Kruskal-Wallis chi-squared = 7.4205, df = 2, p-value = 0.02447

pairwise.wilcox.test(IndInjStats$Protein, IndInjStats$BioSample,
                      p.adjust.method = "BH")

## Warning in wilcox.test.default(xi, xj, paired = paired, ...): cannot compute
## exact p-value with ties

## Warning in wilcox.test.default(xi, xj, paired = paired, ...): cannot compute
## exact p-value with ties

## Warning in wilcox.test.default(xi, xj, paired = paired, ...): cannot compute
## exact p-value with ties

##
## Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data: IndInjStats$Protein and IndInjStats$BioSample
##
## 1 2
## 2 0.358 -
## 3 0.035 0.035
##
## P value adjustment method: BH
```

```

kruskal.test(IDs ~ BioSample, data = IndInjStats)

##
## Kruskal-Wallis rank sum test
##
## data: IDs by BioSample
## Kruskal-Wallis chi-squared = 4.4498, df = 2, p-value = 0.1081

pairwise.wilcox.test(IndInjStats$IDs, IndInjStats$BioSample,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: IndInjStats$IDs and IndInjStats$BioSample
##
## 1 2
## 2 0.65 -
## 3 0.15 0.15
##
## P value adjustment method: BH

kruskal.test(IDs ~ Fraction, data = IndInjStats)

##
## Kruskal-Wallis rank sum test
##
## data: IDs by Fraction
## Kruskal-Wallis chi-squared = 51.964, df = 6, p-value = 1.896e-09

pairwise.wilcox.test(IndInjStats$IDs, IndInjStats$Fraction,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: IndInjStats$IDs and IndInjStats$Fraction
##
## 100R F1 F2 F3 F4 F5
## F1 0.54570 - - - - -
## F2 0.07724 0.06603 - - - -
## F3 6.6e-05 6.6e-05 6.6e-05 - - -
## F4 6.6e-05 6.6e-05 6.6e-05 0.00074 - -
## F5 6.6e-05 6.6e-05 6.6e-05 6.6e-05 0.40583 -
## qEV 6.6e-05 6.6e-05 6.6e-05 0.22196 0.40583 0.02626
##
## P value adjustment method: BH

kruskal.test(Spectra ~ BioSample, data = IndInjStats)

##
## Kruskal-Wallis rank sum test
##
## data: Spectra by BioSample
## Kruskal-Wallis chi-squared = 2.121, df = 2, p-value = 0.3463

pairwise.wilcox.test(IndInjStats$Spectra, IndInjStats$BioSample,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: IndInjStats$Spectra and IndInjStats$BioSample
##
## 1 2
## 2 0.90 -
## 3 0.42 0.42

```

```
##
## P value adjustment method: BH

kruskal.test(Spectra ~ Fraction, data = IndInjStats)

##
## Kruskal-Wallis rank sum test
##
## data: Spectra by Fraction
## Kruskal-Wallis chi-squared = 55.419, df = 6, p-value = 3.814e-10

pairwise.wilcox.test(IndInjStats$Spectra, IndInjStats$Fraction,
                     p.adjust.method = "BH")

##
## Pairwise comparisons using Wilcoxon rank sum exact test
##
## data: IndInjStats$Spectra and IndInjStats$Fraction
##
##      100R    F1      F2      F3      F4      F5
## F1  0.66647 -        -        -        -        -
## F2  0.00022 6.6e-05 -        -        -        -
## F3  6.6e-05 6.6e-05 0.00012 -        -        -
## F4  6.6e-05 6.6e-05 6.6e-05 0.00022 -        -
## F5  6.6e-05 6.6e-05 6.6e-05 6.6e-05 0.24583 -
## qEV 6.6e-05 6.6e-05 6.6e-05 0.03671 0.31219 0.00152
##
## P value adjustment method: BH
```

There is a significant difference in Protein between: F3-100R, F4-100R, F5-100R, qEV-100R, F3-F1, F4-F1, F5-F1, qEV-F1, F4-F2, F5-F2, qEV-F2, F5-F3, qEV-F5. There is a significant difference in PercentIDs between samples 1 & 3. There are significant differences in Percent IDs between: F3-100R, F4-100R, F5-100R, qEV-100R, F3-F1, F4-F1, F5-F1, qEV-F1, F3-F2, F4-F2, F5-F2, qEV-F2. There are significant differences in Percent IDs between: F3-100R, F4-100R, F5-100R, qEV-100R, F3-F1, F4-F1, F5-F1, qEV-F1, F3-F2, F4-F2, F5-F2, qEV-F2. There are significant differences in protein between samples 1 & 3 and sample 2 & 3 note warning message about inability to compute exact p-value with ties is ignored, approximate p-value is sufficient in this test. There are no significant differences in IDs among samples. There are significant differences in IDs between 100R-F3, 100R-F4, 100R-F5, 100R-qEV, F1-F3, F1-F4, F1-F5, F1-qEV, F2-F3, F2-F4, F2-F5, F2-qEV, F3-F4, F3-F5, F5-qEV. There are no significant differences in Spectra among samples. There are significant differences in Spectra between 100R-F2, 100R-F3, 100R-F4, 100R-F5, 100R-qEV, F1-F2, F1-F3, F1-F4, F1-F5, F1-qEV, F2-F3, F2-F4, F2-F5, F2-qEV, F3-F4, F3-F5, F3-qEV, F5-qEV.

7.5.11 Individual LC-MS/MS injections: boxplots by sample (Figure 7.4)

```
#Percent ID
comparisons_percentIDsbiosample <- list( c("1", "3"))
ggplot(IndInjStats, aes(BioSample, PercentIDs))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Percentage of Spectra Identified") +
  stat_compare_means(comparisons = comparisons_percentIDsbiosample, label = "p.signif", method = "t.test")
+
  stat_compare_means(method = "anova", label.y = 35)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

# Protein
comparisons_proteinbiosample <- list( c("1", "3"),c("2", "3"))
ggplot(IndInjStats, aes(BioSample, Protein))+
```

```

stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
geom_boxplot(outlier.shape = 1) +
theme_classic() +
labs( x="Sample", y="Number of Proteins Identified") +
stat_compare_means(comparisons = comparisons_proteinbiosample, label = "p.signif") +
stat_compare_means(label.y = 800)+
theme(axis.text = element_text(size = 15))+
theme(axis.title = element_text(size = 20))

## Warning in wilcox.test.default(c(477, 464, 450, 456, 444, 443, 480, 458, :
## cannot compute exact p-value with ties

## Warning in wilcox.test.default(c(373, 365, 359, 340, 323, 326, 322, 289, :
## cannot compute exact p-value with ties

#IDs
ggplot(IndInjStats, aes(BioSample, IDs))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Number of Spectral IDs") +
  stat_compare_means(label.y = 12000)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

#Spectra
ggplot(IndInjStats, aes(BioSample, Spectra))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Number of Spectra") +
  stat_compare_means(label.y = 42000)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

```

7.5.12 Individual LC-MS/MS injections: boxplots by fraction (Figure 7.5)

```

#Percent ID
comparisons_percentIDsfraction <- list( c("F3", "100R"), c("F4", "100R"), c("F5", "100R"),c("qEV", "100R")
, c("F3", "F1"), c("F4", "F1"),c("F5", "F1"), c("qEV", "F1"), c("F3", "F2"),c("F4", "F2"), c("qEV", "F2"),
c("F5", "F2"))
ggplot(IndInjStats, aes(Fraction, PercentIDs,))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x="Fraction", y="Percentage of Spectra Identified") +
  stat_compare_means(comparisons = comparisons_percentIDsfraction, label = "p.signif", method = "t.test")
+
  stat_compare_means(method = "anova", label.y = 50)+
  geom_hline(yintercept = mean(IndInjStats$PercentIDs), linetype = 2)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

#Protein
comparisons_proteinfraction <- list(c("100R", "F3"), c("100R", "F4"), c("100R", "F5"),c("100R", "qEV"), c(
"F1", "F4"), c("F1", "F5"), c("F1", "qEV"), c("F2", "F4"), c("F2", "F5"),c("F3", "F4"), c("F3", "F5"), c(
"F5", "qEV"),c("F3", "F1"), c("F2", "qEV"))
ggplot(IndInjStats, aes(Fraction, Protein))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x="Fraction", y="Number of Proteins Identified") +
  stat_compare_means(comparisons = comparisons_proteinfraction, label = "p.signif", method = "t.test") +
  stat_compare_means(label.y = 1200)+
  geom_hline(yintercept = mean(IndInjStats$Protein), linetype = 2)+

```

```

theme(axis.text = element_text(size = 15))+
theme(axis.title = element_text(size = 20))

#IDs
comparisons_IDsfraction <- list( c("100R", "F3"), c("100R", "F4"), c("100R", "F5"),c("100R", "qEV"), c("F1", "F3"), c("F1", "F4"),c("F1", "F5"), c("F1", "qEV"), c("F2", "F3"),c("F2", "F4"), c("F2", "F5"), c("F2", "qEV"),c("F3", "F4"), c("F3", "F5"), c("F5", "qEV"))
ggplot(IndInjStats, aes(Fraction, IDs))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x="Fraction", y="Number of Spectral IDs") +
  stat_compare_means(comparisons = comparisons_IDsfraction, label = "p.signif") +
  stat_compare_means(label.y = 25000)+
  geom_hline(yintercept = mean(IndInjStats$IDs), linetype = 2)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

#Spectra
comparisons_spectrafractions <- list(c("100R", "F2"), c("100R", "F3"), c("100R", "F4"),c("100R", "F5"), c("100R", "qEV"), c("F1","F2"),c("F1", "F3"), c("F1", "F4"), c("F1", "F5"),c("F1", "qEV"), c("F2", "F4"), c("F2", "F3"),c("F2", "F5"), c("F2", "qEV"), c("F3", "F4"),c("F3", "F5"), c("F5", "qEV"), c("F2", "F4"),c("F3", "qEV"))
ggplot(IndInjStats, aes(Fraction, Spectra))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x="Fraction", y="Number of Spectra") +
  stat_compare_means(comparisons = comparisons_spectrafractions, label = "p.signif") +
  stat_compare_means(label.y = 75000)+
  geom_hline(yintercept = mean(IndInjStats$Spectra), linetype = 2)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

```

7.5.13 Combined (MudPIT) LC-MS/MS: set up

```

#Scaffold settings: Protein Threshold 99%, Min # Peptides 2, Peptide Threshold 0.1%FDR
#View low scoring matches NOT CHECKED
#MudPIT: 811 Proteins at 99.0% Minimum 2 Min # Peptides 2.3% Decoy FDR
#387026 Spectra at 96% Minimum 0.06% Decoy FDR
CombInjStats <- read.csv("~/Documents/R/2.17.22CombInjStat.csv")
#change BioSample to factor instead of integer
CombInjStats$BioSample <- as.factor(CombInjStats$BioSample)
#view data structure
str(CombInjStats)

## 'data.frame': 21 obs. of 6 variables:
## $ BioSample : Factor w/ 3 levels "1","2","3": 1 1 1 1 1 1 2 2 2 ...
## $ Fraction : chr "100R" "F1" "F2" "F3" ...
## $ Protein : int 542 515 556 391 321 213 275 431 386 366 ...
## $ IDs : int 30959 31156 29615 16146 12489 10668 11326 28275 25765 20626 ...
## $ Spectra : int 116331 116894 109749 92929 82500 76425 79518 114665 115084 98464 ...
## $ PercentIDs: num 26.6 26.7 27 17.4 15.1 ...

print(CombInjStats)

## BioSample Fraction Protein IDs Spectra PercentIDs
## 1 1 100R 542 30959 116331 26.612854
## 2 1 F1 515 31156 116894 26.653206
## 3 1 F2 556 29615 109749 26.984300
## 4 1 F3 391 16146 92929 17.374554
## 5 1 F4 321 12489 82500 15.138182
## 6 1 F5 213 10668 76425 13.958783
## 7 1 qEV 275 11326 79518 14.243317
## 8 2 100R 431 28275 114665 24.658789
## 9 2 F1 386 25765 115084 22.387995
## 10 2 F2 366 20626 98464 20.947757

```

```
## 11      2      F3      310 15077   94015 16.036803
## 12      2      F4      255 13349   88475 15.087877
## 13      2      F5      198 10748   74425 14.441384
## 14      2      qEV      389 17209   93321 18.440650
## 15      3     100R      373 24662  111469 22.124536
## 16      3      F1      342 23922  112919 21.185097
## 17      3      F2      334 20561  103261 19.911680
## 18      3      F3      259 13790   89229 15.454617
## 19      3      F4      121  4955   65577  7.556003
## 20      3      F5      155  7081   71263  9.936433
## 21      3      qEV      266 11476   83538 13.737461
```

7.5.14 Combined (MudPIT) LC-MS/MS: assess univariate normality (Figure 7.6)

```
attach(CombInjStats)

## The following objects are masked from IndInjStats:
##      BioSample, Fraction, IDs, PercentIDs, Protein, Spectra

hist(Protein, main = "Number of Proteins Histogram")

qqnorm(Protein, main = "Number of Proteins QQ Plot")
qqline(Protein)

hist(IDs, main = "Number of Spectral IDs Histogram")

qqnorm(IDs, main = "Number of Spectral IDs QQ Plot")
qqline(IDs)

hist(Spectra, main = "Number of Spectra Histogram")

qqnorm(Spectra, main = "Number of Spectra QQ Plot")
qqline(Spectra)

hist(PercentIDs, main = "Percent of Spectra Identified Histogram")

qqnorm(PercentIDs, main = "Percent of Spectra Identified QQ Plot")
qqline(PercentIDs)

df <- data.frame(CombInjStats$Protein, CombInjStats$IDs,
                 CombInjStats$Spectra, CombInjStats$PercentIDs)
lshap <- lapply(df, shapiro.test)
lres <- sapply(lshap, '[', c("statistic", "p.value"))
lres

##      CombInjStats.Protein CombInjStats.IDs CombInjStats.Spectra
## statistic 0.9718712      0.9393227      0.9324914
## p.value   0.7740438      0.211282      0.1544192
##      CombInjStats.PercentIDs
## statistic 0.9559462
## p.value   0.4385185
```

All data are normally distributed.

7.5.15 Combined (MudPIT) LC-MS/MS: check for equal variance

```
bartlett.test(Protein ~ BioSample, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
```

```

## data: Protein by BioSample
## Bartlett's K-squared = 1.5985, df = 2, p-value = 0.4497

bartlett.test(IDs ~ BioSample, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: IDs by BioSample
## Bartlett's K-squared = 0.91112, df = 2, p-value = 0.6341

bartlett.test(Spectra ~ BioSample, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: Spectra by BioSample
## Bartlett's K-squared = 0.42795, df = 2, p-value = 0.8074

bartlett.test(PercentIDs ~ BioSample, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: PercentIDs by BioSample
## Bartlett's K-squared = 1.2424, df = 2, p-value = 0.5373

bartlett.test(Protein ~ Fraction, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: Protein by Fraction
## Bartlett's K-squared = 2.9714, df = 6, p-value = 0.8124

bartlett.test(IDs ~ Fraction, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: IDs by Fraction
## Bartlett's K-squared = 3.8753, df = 6, p-value = 0.6935

bartlett.test(Spectra ~ Fraction, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: Spectra by Fraction
## Bartlett's K-squared = 9.5078, df = 6, p-value = 0.147

bartlett.test(PercentIDs ~ Fraction, data = CombInjStats)

##
## Bartlett test of homogeneity of variances
##
## data: PercentIDs by Fraction
## Bartlett's K-squared = 3.5003, df = 6, p-value = 0.7439

```

All have equal variance by sample and fraction. ANOVA can be used for all statistics.

7.5.16 Combined (MudPIT) LC-MS/MS: compare means

```

proteinanova <- aov(Protein ~ BioSample, data = CombInjStats)
summary(proteinanova)

```

```
##           Df Sum Sq Mean Sq F value Pr(>F)
## BioSample    2  66242    33121   2.821 0.0859 .
## Residuals   18 211314    11740
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(proteinanova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = Protein ~ BioSample, data = CombInjStats)
##
## $BioSample
##      diff      lwr      upr      p adj
## 2-1 -68.28571 -216.0952  79.52377 0.4802394
## 3-1 -137.57143 -285.3809  10.23805 0.0706137
## 3-2 -69.28571 -217.0952  78.52377 0.4704004

proteinanova <- aov(Protein ~ Fraction, data = CombInjStats)
summary(proteinanova)

##           Df Sum Sq Mean Sq F value Pr(>F)
## Fraction     6 176988    29498   4.106 0.0138 *
## Residuals   14 100567     7183
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(proteinanova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = Protein ~ Fraction, data = CombInjStats)
##
## $Fraction
##      diff      lwr      upr      p adj
## F1-100R -34.333333 -270.6296 201.962970 0.9985005
## F2-100R -30.000000 -266.2963 206.296304 0.9992975
## F3-100R -128.666667 -364.9630 107.629637 0.5340344
## F4-100R -216.333333 -452.6296  19.962970 0.0829774
## F5-100R -260.000000 -496.2963 -23.703696 0.0269997
## qEV-100R -138.666667 -374.9630  97.629637 0.4532057
## F2-F1      4.333333 -231.9630 240.629637 1.0000000
## F3-F1     -94.333333 -330.6296 141.962970 0.8116384
## F4-F1    -182.000000 -418.2963  54.296304 0.1887188
## F5-F1    -225.666667 -461.9630  10.629637 0.0656032
## qEV-F1   -104.333333 -340.6296 131.962970 0.7365687
## F3-F2    -98.666667 -334.9630 137.629637 0.7802365
## F4-F2   -186.333333 -422.6296  49.962970 0.1709305
## F5-F2   -230.000000 -466.2963   6.296304 0.0587542
## qEV-F2   -108.666667 -344.9630 127.629637 0.7016365
## F4-F3    -87.666667 -323.9630 148.629637 0.8557796
## F5-F3   -131.333333 -367.6296 104.962970 0.5120285
## qEV-F3   -10.000000 -246.2963 226.296304 0.9999989
## F5-F4    -43.666667 -279.9630 192.629637 0.9944338
## qEV-F4    77.666667 -158.6296 313.962970 0.9107682
## qEV-F5   121.333333 -114.9630 357.629637 0.5955662

IDsanova <- aov(IDs ~ BioSample, data = CombInjStats)
summary(IDsanova)

##           Df      Sum Sq Mean Sq F value Pr(>F)
## BioSample    2 9.633e+07 48163006    0.72    0.5
## Residuals   18 1.203e+09 66855403
```



```

tukey <- TukeyHSD(IDsanova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = IDs ~ BioSample, data = CombInjStats)
##
## $BioSample
##      diff      lwr      upr      p adj
## 2-1 -1615.714 -12770.02 9538.595 0.9277337
## 3-1 -5130.286 -16284.59 6024.023 0.4832330
## 3-2 -3514.571 -14668.88 7639.737 0.7052902

IDsfanova <- aov(IDs ~ Fraction, data = CombInjStats)
summary(IDsfanova)

##           Df      Sum Sq   Mean Sq F value    Pr(>F)
## Fraction      6 1.121e+09 186753291   14.59 2.64e-05 ***
## Residuals    14 1.792e+08 12800252
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(IDsfanova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = IDs ~ Fraction, data = CombInjStats)
##
## $Fraction
##      diff      lwr      upr      p adj
## F1-100R -1017.6667 -10992.410 8957.0768 0.9997993
## F2-100R -4364.6667 -14339.410 5610.0768 0.7439621
## F3-100R -12961.0000 -22935.743 -2986.2565 0.0078326
## F4-100R -17701.0000 -27675.743 -7726.2565 0.0004558
## F5-100R -18466.3333 -28441.077 -8491.5899 0.0002956
## qEV-100R -14628.3333 -24603.077 -4653.5899 0.0028034
## F2-F1 -3347.0000 -13321.743 6627.7435 0.9028366
## F3-F1 -11943.3333 -21918.077 -1968.5899 0.0147722
## F4-F1 -16683.3333 -26658.077 -6708.5899 0.0008210
## F5-F1 -17448.6667 -27423.410 -7473.9232 0.0005267
## qEV-F1 -13610.6667 -23585.410 -3635.9232 0.0052356
## F3-F2 -8596.3333 -18571.077 1378.4101 0.1134361
## F4-F2 -13336.3333 -23311.077 -3361.5899 0.0062044
## F5-F2 -14101.6667 -24076.410 -4126.9232 0.0038690
## qEV-F2 -10263.6667 -20238.410 -288.9232 0.0419020
## F4-F3 -4740.0000 -14714.743 5234.7435 0.6717176
## F5-F3 -5505.3333 -15480.077 4469.4101 0.5195483
## qEV-F3 -1667.3333 -11642.077 8307.4101 0.9967561
## F5-F4 -765.3333 -10740.077 9209.4101 0.9999619
## qEV-F4 3072.6667 -6902.077 13047.4101 0.9322365
## qEV-F5 3838.0000 -6136.743 13812.7435 0.8349197

spectraanova <- aov(Spectra ~ BioSample, data = CombInjStats)
summary(spectraanova)

##           Df      Sum Sq   Mean Sq F value    Pr(>F)
## BioSample      2 1.471e+08 73556332    0.251    0.781
## Residuals    18 5.275e+09 293058418

tukey <- TukeyHSD(spectraanova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##

```

```

## Fit: aov(formula = Spectra ~ BioSample, data = CombInjStats)
##
## $BioSample
##      diff      lwr      upr      p adj
## 2-1   586.1429 -22767.33 23939.62 0.9977407
## 3-1 -5298.5714 -28652.05 18054.90 0.8328950
## 3-2 -5884.7143 -29238.19 17468.76 0.7985392

spectrafanova <- aov(Spectra ~ Fraction, data = CombInjStats)
summary(spectrafanova)

##           Df      Sum Sq   Mean Sq F value    Pr(>F)
## Fraction    6 4.929e+09 821468117    23.31 1.57e-06 ***
## Residuals   14 4.934e+08 35239678
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(spectrafanova)
print(tukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = Spectra ~ Fraction, data = CombInjStats)
##
## $Fraction
##           diff      lwr      upr      p adj
## F1-100R    810.6667 -15739.731 17361.065 0.9999973
## F2-100R   -10330.3333 -26880.731  6220.065 0.3868436
## F3-100R   -22097.3333 -38647.731 -5546.935 0.0062760
## F4-100R   -35304.3333 -51854.731 -18753.935 0.0000647
## F5-100R   -40117.3333 -56667.731 -23566.935 0.0000151
## qEV-100R -28696.0000 -45246.398 -12145.602 0.0005755
## F2-F1     -11141.0000 -27691.398  5409.398 0.3089657
## F3-F1     -22908.0000 -39458.398 -6357.602 0.0046398
## F4-F1     -36115.0000 -52665.398 -19564.602 0.0000502
## F5-F1     -40928.0000 -57478.398 -24377.602 0.0000120
## qEV-F1    -29506.6667 -46057.065 -12956.269 0.0004349
## F3-F2     -11767.0000 -28317.398  4783.398 0.2567054
## F4-F2     -24974.0000 -41524.398 -8423.602 0.0021683
## F5-F2     -29787.0000 -46337.398 -13236.602 0.0003950
## qEV-F2    -18365.6667 -34916.065 -1815.269 0.0254773
## F4-F3     -13207.0000 -29757.398  3343.398 0.1623471
## F5-F3     -18020.0000 -34570.398 -1469.602 0.0289942
## qEV-F3     -6598.6667 -23149.065  9951.731 0.8124914
## F5-F4     -4813.0000 -21363.398 11737.398 0.9474357
## qEV-F4      6608.3333 -9942.065 23158.731 0.8115237
## qEV-F5     11421.3333 -5129.065 27971.731 0.2846967

anova <- aov(PercentIDs ~ BioSample, data = CombInjStats)
summary(anova)

##           Df Sum Sq Mean Sq F value    Pr(>F)
## BioSample    2   73.0   36.51    1.26  0.308
## Residuals   18  521.7   28.98

tukey <- TukeyHSD(anova)
print(tukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = PercentIDs ~ BioSample, data = CombInjStats)
##
## $BioSample
##           diff      lwr      upr      p adj
## 2-1 -1.280563 -8.624786 6.063660 0.8972037

```

```
## 3-1 -4.437053 -11.781276 2.907170 0.2957405
## 3-2 -3.156490 -10.500713 4.187733 0.5281121

fanova <- aov(PercentIDs ~ Fraction, data = CombInjStats)
summary(fanova)

##           Df Sum Sq Mean Sq F value    Pr(>F)
## Fraction     6  473.3    78.88   9.097 0.000359 ***
## Residuals    14  121.4     8.67
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(fanova)
print(tukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = PercentIDs ~ Fraction, data = CombInjStats)
##
## $Fraction
##           diff           lwr           upr           p adj
## F1-100R    -1.0566270    -9.266484    7.15323047 0.9992411
## F2-100R    -1.8508140   -10.060671    6.35904347 0.9844064
## F3-100R    -8.1767350   -16.386592    0.03312247 0.0512405
## F4-100R   -11.8713725   -20.081230   -3.66151500 0.0031768
## F5-100R   -11.6865265   -19.896384   -3.47666903 0.0036451
## qEV-100R   -8.9915837   -17.201441   -0.78172620 0.0278649
## F2-F1       -0.7941870    -9.004044    7.41567047 0.9998525
## F3-F1      -7.1201080   -15.329965    1.08974947 0.1099365
## F4-F1     -10.8147455   -19.024603   -2.60488800 0.0070098
## F5-F1     -10.6298995   -18.839757   -2.42004203 0.0080598
## qEV-F1      -7.9349567   -16.144814    0.27490080 0.0612252
## F3-F2       -6.3259210   -14.535778    1.88393647 0.1884078
## F4-F2     -10.0205585   -18.230416   -1.81070100 0.0127859
## F5-F2       -9.8357125   -18.045570   -1.62585503 0.0147099
## qEV-F2      -7.1407697   -15.350627    1.06908780 0.1083544
## F4-F3       -3.6946375   -11.904495    4.51522000 0.7205382
## F5-F3       -3.5097915   -11.719649    4.70006597 0.7624313
## qEV-F3      -0.8148487    -9.024706    7.39500880 0.9998288
## F5-F4        0.1848460    -8.025012    8.39470344 1.0000000
## qEV-F4       2.8797888    -5.330069   11.08964627 0.8838570
## qEV-F5       2.6949428    -5.514915   10.90480030 0.9112479
```

No difference for: protein by sample, IDs by sample, spectra by sample, or percent IDs by sample.
Significant difference for protein by fraction: F5-100R
Significant differences for IDs by fraction: F3-100R, F4-100R, F5-100R, qEV-100R, F3-F1, F4-F1, F5-F1, qEV-F1, F4-F2, F5-F2
Significant differences for spectra by fraction: F3-100R, F4-100R, F5-100R, qEV-100R, F3-F1, F4-F1, F5-F1, qEV-F1, F4-F2, F5-F2, qEV-F2, F5-F3
Significant differences for Percent IDs by fraction: F4-100R, F5-100R, qEV-100R, F4-F1, F5-F1, F4-F2, F5-F2

7.5.17 Combined (MudPIT) LC-MS/MS: boxplots by sample (Figure 3.8)

```
#IDs
ggplot(CombInjStats, aes(BioSample, IDs))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs(x = "Sample", y = "Number of Spectral IDs") +
  stat_compare_means(method = "anova", label.y = 35000)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))
```

```

#Spectra
ggplot(CombInjStats, aes(BioSample, Spectra))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Number of Spectra") +
  stat_compare_means(method = "anova", label.y = 130000)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

#Percent ID
ggplot(CombInjStats, aes(BioSample, PercentIDs))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Percentage of Spectra Identified") +
  stat_compare_means(method = "anova", label.y = 35)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

#Protein
ggplot(CombInjStats, aes(BioSample, Protein))+
  stat_boxplot(geom = "errorbar", linetype = 1, width = 0.5) +
  geom_boxplot(outlier.shape = 1) +
  theme_classic() +
  labs( x="Sample", y="Number of Proteins Identified") +
  stat_compare_means(method = "anova", label.y = 800)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))

```

7.5.18 Combined (MudPIT) LC-MS/MS: barplots by fraction (Figure 3.12)

```

#protein bar chart by fraction with error bars
data_summary <- function(data, varname, groupnames){
  require(plyr)
  summary_func <- function(x, col){
    c(mean = mean(x[[col]], na.rm = TRUE),
      sd = sd(x[[col]], na.rm = TRUE))
  }
  data_sum <- dplyr::ddply(data, groupnames, .fun = summary_func,
    varname)
  data_sum <- rename(data_sum, c("mean" = varname))
  return(data_sum)
}
df2 <- data_summary(CombInjStats, varname = 'Protein',
  groupnames = c("Fraction"))

## Loading required package: plyr

## -----

## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)

## -----

##
## Attaching package: 'plyr'

## The following object is masked from 'package:purrr':
##
## compact

```

```
## The following object is masked from 'package:ggpubr':
##
##      mutate

## The following objects are masked from 'package:dplyr':
##
##      arrange, count, desc, failwith, id, mutate, rename, summarise,
##      summarize

print(df2)

##      Fraction Protein      sd
## 1      100R 448.6667  85.87394
## 2       F1 414.3333  89.91292
## 3       F2 418.6667 120.00556
## 4       F3 320.0000  66.56576
## 5       F4 232.3333 101.90846
## 6       F5 188.6667  30.10537
## 7       qEV 310.0000  68.56384

comparisons_ProteinFraction <- list(c("100R", "F5"))
ggplot(data=CombInjStats, aes(x = Fraction, y = Protein))+
  geom_bar(aes(fill = Fraction), stat = "summary", fun = "mean",
           show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df2, aes(ymin = Protein - sd, ymax = Protein + sd),
               width = .2, position = )+
  theme_classic()+
  labs(x = "Fraction", y = "Number of Proteins Identified", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means(method = "anova", label.y = 650 )+
  stat_compare_means(comparisons = comparisons_ProteinFraction, label = "p.signif", method = "t.test")

#Spectra bar chart by fraction with error bars
df3 <- data_summary(CombInjStats, varname = 'Spectra',
                    groupnames = c("Fraction"))
print(df3)

##      Fraction Spectra      sd
## 1      100R 114155.00 2470.797
## 2       F1 114965.67 1990.140
## 3       F2 103824.67 5663.576
## 4       F3 92057.67 2509.156
## 5       F4 78850.67 11877.198
## 6       F5 74037.67 2602.707
## 7       qEV 85459.00 7099.182

comparisons_SpectraFraction <- list(c("100R", "F3"), c("100R", "F4"), c("100R", "F5"), c("100R", "qEV"), c(
"F1", "F3"), c("F1", "F4"), c("F1", "F5"), c("F1", "qEV"), c("F2", "F4"), c("F2", "F5"), c("F2", "qEV"), c(
"F3", "F5"))
ggplot(data=CombInjStats, aes(x = Fraction, y = Spectra))+
  geom_bar(aes(fill = Fraction), stat = "summary", fun = "mean",
           show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df3, aes(ymin = Spectra - sd, ymax = Spectra + sd),
               width = .2, position = )+
  theme_classic()+
  labs(x = "Fraction", y = "Number of Spectra", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means(method = "anova", label.y = 300000 )+
  stat_compare_means(comparisons = comparisons_SpectraFraction, label = "p.signif",
                    method = "t.test", label.y = c(118000, 133000, 148000,
```

```
163000, 178000, 193000,
208000, 223000, 238000,
253000, 268000, 283000))
```

#Spectral IDs barchart with error bars

```
df4 <- data_summary(CombInjStats, varname = 'IDs',
                    groupnames = c("Fraction"))
```

```
print(df4)
```

```
## Fraction      IDs      sd
## 1      100R 27965.33 3159.901
## 2        F1 26947.67 3759.217
## 3        F2 23600.67 5208.667
## 4        F3 15004.33 1179.680
## 5        F4 10264.33 4618.080
## 6        F5  9499.00 2094.431
## 7       qEV 13337.00 3354.089
```

```
comparisons_IDsFraction <- list(c("100R", "F3"), c("100R", "F4"), c("100R", "F5"), c("100R", "qEV"), c("F1", "F3"), c("F1", "F4"), c("F1", "F5"), c("F1", "qEV"), c("F2", "F4"), c("F2", "F5"))
ggplot(data=CombInjStats, aes(x = Fraction, y = IDs))+
  geom_bar(aes(fill = Fraction), stat = "summary", fun = "mean",
           show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df4, aes(ymin = IDs - sd, ymax = IDs + sd),
               width = .2, position = )+
  theme_classic()+
  labs(x = "Fraction", y = "Number of Spectral IDs", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 60000)+
  stat_compare_means(comparisons = comparisons_IDsFraction, label = "p.signif",
                    method = "t.test")
```

#percentIDs barchart with errorbars

```
df5 <- data_summary(CombInjStats, varname = 'PercentIDs',
                    groupnames = c("Fraction"))
```

```
print(df5)
```

```
## Fraction PercentIDs      sd
## 1      100R   24.46539 2.2504002
## 2        F1   23.40877 2.8734185
## 3        F2   22.61458 3.8195825
## 4        F3   16.28866 0.9844352
## 5        F4   12.59402 4.3631240
## 6        F5   12.77887 2.4734185
## 7       qEV   15.47381 2.5817785
```

```
comparisons_PercentIDsFraction <- list(c("100R", "F4"), c("100R", "F5"), c("100R", "qEV"), c("F1", "F4"), c("F1", "F5"), c("F2", "F4"), c("F2", "F5"))
ggplot(data=CombInjStats, aes(x = Fraction, y = PercentIDs))+
  geom_bar(aes(fill = Fraction), stat = "summary", fun = "mean",
           show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df5, aes(ymin = PercentIDs - sd, ymax = PercentIDs + sd),
               width = .2, position = )+
  theme_classic()+
  labs(x = "Fraction", y = "Percentage of Spectra Identified", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 40)+
  stat_compare_means(comparisons = comparisons_PercentIDsFraction, label = "p.signif",
                    method = "t.test")
```

7.5.19 Chaperonins by sample (Figure 3.11): set up

```
Chaperonins <- read.csv("~/Documents/R/NSAFIndInjChapbySample100R.csv")
#Change sample to factor
Chaperonins$Sample <- as.factor(Chaperonins$Sample)
print(Chaperonins)

##   Sample Injection   GroES   GroEL2   GroEL1
## 1      1          1 0.100950 0.0062505 0.00084623
## 2      1          2 0.111320 0.0061273 0.00068845
## 3      1          3 0.114450 0.0049590 0.00070974
## 4      2          1 0.042127 0.0013117 0.00000000
## 5      2          2 0.049021 0.0018297 0.00000000
## 6      2          3 0.052190 0.0012261 0.00000000
## 7      3          1 0.067787 0.0012099 0.00000000
## 8      3          2 0.080705 0.0020820 0.00000000
## 9      3          3 0.074042 0.0024570 0.00000000
```

7.5.20 Chaperonins by sample (Figure 3.11): assess normality

```
df <- data.frame(Chaperonins$GroES, Chaperonins$GroEL2,
                 Chaperonins$GroEL1)
lshap <- lapply(df, shapiro.test)
lres <- sapply(lshap, '[', c("statistic", "p.value"))
lres

##           Chaperonins.GroES Chaperonins.GroEL2 Chaperonins.GroEL1
## statistic 0.9236018          0.7946915          0.6593396
## p.value   0.4228912          0.01775789          0.0004748249
```

7.5.21 Chaperonins by sample (Figure 3.11): compare means

```
#GroES anova
groESanova <- aov(GroES ~ Sample, data = Chaperonins)
summary(groESanova)

##           Df    Sum Sq   Mean Sq F value    Pr(>F)
## Sample      2 0.005640 2.82e-03   71.61 6.5e-05 ***
## Residuals    6 0.000236 3.94e-05
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(groESanova)
print(tukey)

##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = GroES ~ Sample, data = Chaperonins)
##
## $Sample
##           diff           lwr           upr       p adj
## 2-1 -0.06112733 -0.07684826 -0.04540641 0.0000518
## 3-1 -0.03472867 -0.05044959 -0.01900774 0.0012283
## 3-2  0.02639867  0.01067774  0.04211959 0.0050684

# all samples are significantly different from one another

groEL1anova <- aov(GroEL1 ~ Sample, data = Chaperonins)
summary(groEL1anova)

##           Df    Sum Sq   Mean Sq F value    Pr(>F)
## Sample      2 1.119e-06 5.597e-07   229.1 2.16e-06 ***
## Residuals    6 1.470e-08 2.400e-09
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(groEL1anova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = GroEL1 ~ Sample, data = Chaperonins)
##
## $Sample
##          diff          lwr          upr    p adj
## 2-1 -0.00074814 -0.0008719702 -0.0006243098 3.6e-06
## 3-1 -0.00074814 -0.0008719702 -0.0006243098 3.6e-06
## 3-2  0.00000000 -0.0001238302  0.0001238302 1.0e+00

groEL2anova <- aov(GroEL2 ~ Sample, data = Chaperonins)
summary(groEL2anova)

##          Df      Sum Sq   Mean Sq F value    Pr(>F)
## Sample      2 3.382e-05 1.691e-05   49.54 0.000186 ***
## Residuals    6 2.050e-06 3.410e-07
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

tukey <- TukeyHSD(groEL2anova)
print(tukey)

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = GroEL2 ~ Sample, data = Chaperonins)
##
## $Sample
##          diff          lwr          upr    p adj
## 2-1 -0.0043231000 -0.005786812 -0.002859388 0.0002490
## 3-1 -0.0038626333 -0.005326345 -0.002398921 0.0004665
## 3-2  0.0004604667 -0.001003245  0.001924179 0.6230185
```

7.5.22 Chaperonins by sample (Figure 3.11): plot barcharts

```
data_summary <- function(data, varname, groupnames){
  require(plyr)
  summary_func <- function(x, col){
    c(mean = mean(x[[col]], na.rm = TRUE),
      sd = sd(x[[col]], na.rm = TRUE))
  }
  data_sum <- ddply(data, groupnames, .fun = summary_func,
    varname)
  data_sum <- rename(data_sum, c("mean" = varname))
  return(data_sum)
}
df2 <- data_summary(Chaperonins, varname = 'GroES',
  groupnames = c("Sample"))
print(df2)

## Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroESFraction <- list(c("1", "2"), c("1", "3"), c("2", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroES))+
  geom_bar(aes(fill = Sample), stat = "summary", fun = "mean",
```



```

        show.legend = FALSE, position = position_dodge()) +
geom_errorbar(data = df2, aes(ymin = GroES - sd, ymax = GroES + sd),
              width = .2, position = )+
theme_classic()+
labs (x = "100R Sample", y = "GroES NSAF", fill = "Sample")+
scale_fill_grey(start = 0.15, end = 0.9)+
theme(axis.text = element_text(size = 15))+
theme(axis.title = element_text(size = 20))+
theme(legend.title = element_text(size = 15))+
theme(legend.text = element_text(size = 15))+
stat_compare_means( method = "anova", label.y = 0.15)+
stat_compare_means(comparisons = comparisons_GroESFraction, label = "p.signif", method = "t.test")

#GroEL1
df3 <- data_summary(Chaperonins, varname = 'GroEL1',
                    groupnames = c("Sample"))
print(df2)

##   Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroEL1Fraction <- list(c("1", "2"), c("1", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroEL1))+
  geom_bar( aes(fill = Sample), stat = "summary", fun = "mean",
            show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df3, aes(ymin = GroEL1 - sd, ymax = GroEL1 + sd),
                width = .2, position = )+
  theme_classic()+
  labs (x = "100R Sample", y = "GroEL1 NSAF", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 0.001)+
  stat_compare_means(comparisons = comparisons_GroEL1Fraction, label = "p.signif", method = "t.test")

#GroEL2
df4 <- data_summary(Chaperonins, varname = 'GroEL2',
                    groupnames = c("Sample"))
print(df2)

##   Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroEL2Fraction <- list(c("1", "2"), c("1", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroEL2))+
  geom_bar( aes(fill = Sample), stat = "summary", fun = "mean",
            show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df4, aes(ymin = GroEL2 - sd, ymax = GroEL2 + sd),
                width = .2, position = )+
  theme_classic()+
  labs (x = "100R Sample", y = "GroEL2 NSAF", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 0.008)+
  stat_compare_means(comparisons = comparisons_GroEL2Fraction, label = "p.signif", method = "t.test")

```

7.5.23 Chaperonins by sample (Figure 3.11): barplots

```

data_summary <- function(data, varname, groupnames){
  require(plyr)
  summary_func <- function(x, col){
    c(mean = mean(x[[col]], na.rm = TRUE),
      sd = sd(x[[col]], na.rm = TRUE))
  }
  data_sum <- ddply(data, groupnames, .fun = summary_func,
    varname)
  data_sum <- rename(data_sum, c("mean" = varname))
  return(data_sum)
}
df2 <- data_summary(Chaperonins, varname = 'GroES',
  groupnames = c("Sample"))
print(df2)

##   Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroESFraction <- list(c("1", "2"), c("1", "3"), c("2", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroES))+
  geom_bar( aes(fill = Sample), stat = "summary", fun = "mean",
    show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df2, aes(ymin = GroES - sd, ymax = GroES + sd),
    width = .2, position = )+
  theme_classic()+
  labs (x = "100R Sample", y = "GroES NSAF", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 0.15)+
  stat_compare_means(comparisons = comparisons_GroESFraction, label = "p.signif", method = "t.test")

#GroEL1
df3 <- data_summary(Chaperonins, varname = 'GroEL1',
  groupnames = c("Sample"))
print(df2)

##   Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroEL1Fraction <- list(c("1", "2"), c("1", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroEL1))+
  geom_bar( aes(fill = Sample), stat = "summary", fun = "mean",
    show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df3, aes(ymin = GroEL1 - sd, ymax = GroEL1 + sd),
    width = .2, position = )+
  theme_classic()+
  labs (x = "100R Sample", y = "GroEL1 NSAF", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means( method = "anova", label.y = 0.001)+
  stat_compare_means(comparisons = comparisons_GroEL1Fraction, label = "p.signif", method = "t.test")

#GroEL2
df4 <- data_summary(Chaperonins, varname = 'GroEL2',
  groupnames = c("Sample"))
print(df2)

```

```
## Sample      GroES      sd
## 1      1 0.10890667 0.007066161
## 2      2 0.04777933 0.005145123
## 3      3 0.07417800 0.006460074

comparisons_GroEL2Fraction <- list(c("1", "2"), c("1", "3"))
ggplot(data=Chaperonins, aes(x = Sample, y = GroEL2))+
  geom_bar(aes(fill = Sample), stat = "summary", fun = "mean",
           show.legend = FALSE, position = position_dodge()) +
  geom_errorbar(data = df4, aes(ymin = GroEL2 - sd, ymax = GroEL2 + sd),
               width = .2, position = )+
  theme_classic()+
  labs(x = "100R Sample", y = "GroEL2 NSAF", fill = "Sample")+
  scale_fill_grey(start = 0.15, end = 0.9)+
  theme(axis.text = element_text(size = 15))+
  theme(axis.title = element_text(size = 20))+
  theme(legend.title = element_text(size = 15))+
  theme(legend.text = element_text(size = 15))+
  stat_compare_means(method = "anova", label.y = 0.008)+
  stat_compare_means(comparisons = comparisons_GroEL2Fraction, label = "p.signif", method = "t.test")
```

7.5.24 Heatmaps: significantly different by sample (Figure 3.10)

```
df3 <- read.csv("~/Documents/R/NSAFheatmapSigbySample.csv")
print(df3)

## Alternate.ID S1_100R S1_F1 S1_F2 S1_F3 S1_F4
## 1 guaB1 1.2196e-03 1.0188e-03 1.6950e-03 2.1731e-03 1.1898e-03
## 2 alr 5.4052e-04 5.0044e-04 8.0675e-04 6.3452e-04 5.3689e-04
## 3 gltB 2.5961e-04 1.7311e-04 3.7873e-04 5.0792e-04 2.5447e-04
## 4 Rv2226 1.4641e-03 1.4269e-03 2.5365e-03 3.1431e-03 3.0298e-03
## 5 Rv1738 1.9976e-03 2.0550e-03 1.7747e-03 2.8227e-03 2.2047e-03
## 6 pca 1.3885e-04 1.2630e-04 1.2829e-04 1.2677e-04 1.8389e-04
## 7 htpG 9.6742e-04 9.8998e-04 9.7981e-04 5.3629e-04 4.8046e-04
## 8 grpE 2.5303e-03 3.5043e-03 2.2717e-03 4.9506e-03 3.0865e-03
## 9 clpB 2.4112e-03 2.2180e-03 2.2296e-03 2.1421e-03 1.8940e-03
## 10 Rv3075c 1.1214e-03 6.6234e-04 2.2098e-03 1.7951e-03 8.4381e-04
## 11 rpl0 1.6434e-03 1.2535e-03 2.0567e-03 1.6776e-03 1.0646e-03
## 12 fabG4 1.9991e-03 1.8587e-03 2.5477e-03 2.0231e-03 6.2765e-04
## 13 rpoB 6.9075e-04 5.6962e-04 7.6473e-04 6.7573e-04 1.9791e-04
## 14 rpoC 7.6893e-04 5.9487e-04 1.7494e-03 1.6285e-03 4.9211e-04
## 15 tuf 2.8978e-04 2.3107e-04 3.0894e-04 3.0925e-04 3.2708e-04
## 16 accA3 1.1997e-03 1.3048e-03 1.0566e-03 1.5988e-03 9.0667e-04
## 17 wag31 1.1235e-03 1.0558e-03 5.1331e-03 4.4746e-03 2.1919e-03
## 18 rne 3.7218e-04 3.6272e-04 7.9357e-04 1.2850e-04 5.4365e-05
## 19 mraZ 4.3771e-04 0.0000e+00 2.5665e-03 1.7128e-03 1.6304e-03
## 20 ettA 7.6651e-04 1.6398e-04 5.9794e-04 3.6578e-04 0.0000e+00
## 21 menB 1.8605e-03 1.4894e-03 1.4876e-03 2.6651e-03 1.6500e-03
## 22 echA21 2.1702e-03 1.9295e-03 2.1107e-03 2.9796e-03 3.0254e-03
## 23 dapB 0.0000e+00 0.0000e+00 6.3552e-04 3.3323e-04 0.0000e+00
## 24 cbs 1.1241e-04 1.7529e-04 2.3969e-04 0.0000e+00 0.0000e+00
## 25 glyA1 3.1201e-03 2.4837e-03 3.6564e-03 3.8677e-03 2.8389e-03
## 26 Rv0458 2.0576e-05 0.0000e+00 1.0968e-04 4.0257e-05 0.0000e+00
## 27 echA8 6.4947e-04 3.5604e-04 9.9532e-04 1.6678e-03 1.7135e-03
## 28 accA2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 29 desA1 4.9382e-04 5.7151e-04 1.1187e-03 4.2270e-04 0.0000e+00
## 30 glgX 8.6813e-05 1.1281e-04 6.1701e-05 0.0000e+00 1.7965e-04
## 31 Rv3161c 1.1743e-03 1.2509e-03 1.1646e-03 1.1755e-03 8.8158e-04
## 32 accD2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 33 fadE8 3.8495e-05 3.7516e-05 0.0000e+00 0.0000e+00 1.9118e-04
## 34 mtr 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 35 gltX 1.2348e-03 1.2034e-03 1.6115e-03 1.2496e-03 5.2867e-04
## 36 fadE22 2.1703e-04 3.5253e-04 2.3138e-04 3.1139e-04 0.0000e+00
## 37 icd2 2.8286e-03 2.8931e-03 3.0305e-03 3.8081e-03 4.2769e-03
## 38 htdY 1.5828e-03 1.2270e-03 8.4371e-04 2.8152e-04 1.7865e-04
## S1_F5 S1_qEV S2_100R S2_F1 S2_F2 S2_F3 S2_F4
```

```
## 1 2.5384e-04 1.3804e-03 1.9801e-03 0.00236680 0.00176580 2.4713e-03 1.7908e-03
## 2 0.0000e+00 6.4237e-04 3.3204e-04 0.00041420 0.00049612 4.8106e-04 0.0000e+00
## 3 1.9906e-04 3.0672e-04 1.0492e-03 0.00118980 0.00089878 1.6721e-03 1.6172e-03
## 4 1.7183e-03 2.7926e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 5 0.0000e+00 2.3447e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 6 0.0000e+00 9.7783e-05 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 7 2.3491e-04 3.4065e-04 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 8 2.1989e-03 7.0341e-04 5.9994e-04 0.00049479 0.00061118 0.0000e+00 0.0000e+00
## 9 4.6599e-04 2.9240e-04 9.0685e-05 0.00010284 0.00000000 0.0000e+00 6.1307e-05
## 10 2.9704e-04 1.2564e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 11 0.0000e+00 1.5096e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 12 4.6867e-04 6.0684e-04 0.0000e+00 0.00000000 0.00014060 0.0000e+00 0.0000e+00
## 13 0.0000e+00 3.0404e-04 0.0000e+00 0.00000000 0.00000000 5.9112e-05 0.0000e+00
## 14 1.3859e-04 1.4445e-03 4.8696e-05 0.00000000 0.00000000 7.0551e-05 0.0000e+00
## 15 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 16 5.0661e-04 5.5101e-04 7.9037e-04 0.00084785 0.00023938 1.9343e-04 1.7329e-04
## 17 0.0000e+00 3.1789e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 18 9.5688e-05 2.6018e-04 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 19 1.9131e-03 1.3486e-03 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 20 0.0000e+00 4.4436e-04 0.0000e+00 0.00000000 0.00000000 0.0000e+00 0.0000e+00
## 21 1.0649e-03 0.0000e+00 4.8982e-04 0.00069433 0.00101650 7.3921e-04 1.0762e-03
## 22 2.7734e-03 2.4132e-03 8.0456e-03 0.00827520 0.00920240 1.1013e-02 1.3661e-02
## 23 0.0000e+00 0.0000e+00 1.0463e-03 0.00065257 0.00091192 1.0421e-03 4.2440e-04
## 24 0.0000e+00 0.0000e+00 1.3535e-03 0.00144090 0.00099741 1.5508e-03 1.2885e-03
## 25 3.8864e-03 3.3337e-03 5.4720e-03 0.00587360 0.00459080 5.1404e-03 4.5698e-03
## 26 0.0000e+00 0.0000e+00 1.2387e-03 0.00106070 0.00103870 8.2407e-04 5.1271e-04
## 27 1.8924e-03 1.6080e-03 5.8848e-03 0.00627760 0.00329110 4.6964e-03 3.5401e-03
## 28 0.0000e+00 0.0000e+00 7.3020e-04 0.00095880 0.00014356 7.6559e-04 1.1302e-03
## 29 0.0000e+00 0.0000e+00 2.3889e-03 0.00309610 0.00127480 1.6481e-03 1.7688e-03
## 30 2.9512e-04 0.0000e+00 1.4755e-03 0.00179410 0.00110670 1.3521e-03 1.6945e-03
## 31 3.9787e-04 0.0000e+00 3.5565e-03 0.00403320 0.00355100 2.9166e-03 2.7900e-03
## 32 0.0000e+00 0.0000e+00 1.0176e-03 0.00112650 0.00000000 7.4592e-04 1.1793e-03
## 33 0.0000e+00 0.0000e+00 1.0641e-03 0.00158220 0.00085387 6.8520e-04 7.6736e-04
## 34 0.0000e+00 0.0000e+00 8.9355e-04 0.00114000 0.00069536 6.5740e-04 9.6275e-04
## 35 0.0000e+00 1.1245e-04 2.1710e-03 0.00192810 0.00107480 1.8948e-03 1.5384e-03
## 36 0.0000e+00 0.0000e+00 6.0440e-04 0.00076604 0.00033201 5.7948e-04 5.0474e-04
## 37 4.9777e-03 2.8475e-03 9.2557e-03 0.01010600 0.00732600 1.0126e-02 1.2387e-02
## 38 4.1927e-04 0.0000e+00 2.3424e-03 0.00305730 0.00220120 1.5207e-03 1.8823e-03
## S2_F5 S2_qEV S3_100R S3_F1 S3_F2 S3_F3 S3_F4
## 1 0.00040608 2.3565e-03 5.2050e-04 2.5256e-04 0.00047574 1.0247e-03 0.00000000
## 2 0.00000000 6.5545e-04 0.0000e+00 0.0000e+00 0.00021085 0.0000e+00 0.00000000
## 3 0.00140120 9.8137e-04 8.9801e-04 1.1092e-03 0.00149230 1.3982e-03 0.0022161
## 4 0.00000000 0.0000e+00 1.0800e-04 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 5 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 6 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 7 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 8 0.00000000 0.0000e+00 7.0729e-04 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 9 0.00000000 0.0000e+00 0.0000e+00 7.1331e-05 0.00000000 0.0000e+00 0.00000000
## 10 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 11 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00089190 0.0000e+00 0.00000000
## 12 0.00000000 0.0000e+00 1.8305e-04 0.0000e+00 0.00014341 1.6217e-04 0.00000000
## 13 0.00000000 1.6521e-04 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 14 0.00000000 4.4366e-04 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 15 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00012331 0.0000e+00 0.00000000
## 16 0.00000000 7.7847e-04 4.8479e-04 3.0245e-04 0.00000000 2.8631e-04 0.00000000
## 17 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 18 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 19 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00170740 0.0000e+00 0.00000000
## 20 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 21 0.00000000 3.0990e-04 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 22 0.01313300 5.2561e-03 1.4660e-03 1.3798e-03 0.00207920 2.6870e-03 0.0033251
## 23 0.00039696 1.1121e-03 0.0000e+00 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 24 0.00097815 0.0000e+00 1.1941e-04 2.6073e-04 0.00010524 0.0000e+00 0.00000000
## 25 0.00592120 6.0873e-03 2.7829e-03 3.7288e-03 0.00245270 3.0256e-03 0.0013372
## 26 0.00000000 1.2284e-03 5.4639e-05 0.0000e+00 0.00000000 0.0000e+00 0.00000000
## 27 0.00302740 2.0446e-03 8.0843e-04 1.0591e-03 0.00088670 1.5278e-03 0.0015193
## 28 0.00116650 1.4297e-03 5.8145e-04 4.0810e-04 0.00014642 4.0472e-04 0.00000000
## 29 0.00220600 1.4971e-03 1.1064e-03 1.1185e-03 0.00101130 3.6303e-04 0.00000000
## 30 0.00193340 8.0978e-05 8.4528e-04 9.6481e-04 0.00049667 8.1690e-04 0.00000000
```

```
## 31 0.00254600 1.5284e-03 2.2843e-03 2.4940e-03 0.00191750 1.7988e-03 0.0010221
## 32 0.00134820 2.1338e-03 7.3314e-04 6.5749e-04 0.00015385 5.1030e-04 0.0000000
## 33 0.00041869 1.7954e-04 3.3222e-04 2.7901e-04 0.00063067 0.0000e+00 0.0000000
## 34 0.00113010 1.2720e-04 6.6389e-04 1.0213e-03 0.00070925 3.2080e-04 0.0000000
## 35 0.00105860 2.1448e-03 1.1307e-03 8.9499e-04 0.00000000 6.0100e-04 0.0000000
## 36 0.00035971 1.6196e-04 1.9211e-04 2.0974e-04 0.00027091 6.8075e-05 0.0000000
## 37 0.01314200 2.8735e-03 4.6852e-03 5.7444e-03 0.00489410 6.9176e-03 0.0097833
## 38 0.00257110 0.0000e+00 1.0030e-03 1.2515e-03 0.00056128 0.0000e+00 0.0000000
##      S3_F5      S3_qEV
## 1 0.00000000 0.00057997
## 2 0.00000000 0.00000000
## 3 0.00008451 0.00065494
## 4 0.00000000 0.00000000
## 5 0.00000000 0.00000000
## 6 0.00000000 0.00000000
## 7 0.00019945 0.00000000
## 8 0.00036609 0.00000000
## 9 0.00020290 0.00000000
## 10 0.00000000 0.00000000
## 11 0.00000000 0.00000000
## 12 0.00000000 0.00000000
## 13 0.00000000 0.00000000
## 14 0.00000000 0.00000000
## 15 0.00000000 0.00000000
## 16 0.00000000 0.00027780
## 17 0.00000000 0.00000000
## 18 0.00000000 0.00000000
## 19 0.00000000 0.00000000
## 20 0.00000000 0.00000000
## 21 0.00123290 0.00000000
## 22 0.00251180 0.00202780
## 23 0.00000000 0.00000000
## 24 0.00000000 0.00000000
## 25 0.00098209 0.00374210
## 26 0.00000000 0.00000000
## 27 0.00083687 0.00108090
## 28 0.00000000 0.00000000
## 29 0.00000000 0.00065752
## 30 0.00000000 0.00000000
## 31 0.00000000 0.00000000
## 32 0.00000000 0.00000000
## 33 0.00000000 0.00000000
## 34 0.00000000 0.00000000
## 35 0.00000000 0.00022678
## 36 0.00000000 0.00000000
## 37 0.00502330 0.00294580
## 38 0.00000000 0.00000000
```

```
heatmap(as.matrix(df3 [, -1]), xlab = "Sample", ylab = "Protein")
```

7.5.25 Heatmaps: significantly different by fraction (Figure 3.13)

```
df2 <- read.csv("~/Documents/R/2.18.22NSAFheatmapSigbyFraction.csv")
print(df2)
```

	Alternate.ID	S1_100R	S2_100R	S3_100R	S1_F1	S2_F1
## 1	metB	0.00150570	0.00208110	0.00210620	0.00117920	0.00191050
## 2	Rv3401	0.00128740	0.00174480	0.00193840	0.00109950	0.00138690
## 3	accD1	0.00187340	0.00232590	0.00238270	0.00163360	0.00252780
## 4	dcd	0.00115300	0.00128170	0.00109350	0.00107020	0.00137700
## 5	pfkA	0.00118620	0.00149470	0.00125180	0.00136350	0.00135600
## 6	eis	0.00360710	0.00414480	0.00454810	0.00369250	0.00470020
## 7	tatA	0.00100550	0.00000000	0.00000000	0.00000000	0.00000000
## 8	ssb	0.00985960	0.00844040	0.00743230	0.00669530	0.00682420
## 9	Rv2744c	0.00324550	0.00137660	0.00348840	0.00090372	0.00064598
## 10	gap	0.00187720	0.00147450	0.00081717	0.00101970	0.00017150
## 11	pnp	0.00199760	0.00144870	0.00143670	0.00205500	0.00137230

```

## 12      sodB 0.00841620 0.00891610 0.00836420 0.00943020 0.00954930
## 13      leuA 0.00309400 0.00402020 0.00423700 0.00323640 0.00455900
## 14      pepN 0.00218090 0.00330470 0.00267050 0.00219630 0.00357880
## 15      Rv2971 0.00114680 0.00122710 0.00088411 0.00100950 0.00159780
## 16      purA 0.00057956 0.00074172 0.00041681 0.00042362 0.00060561
## 17      glgE 0.00200900 0.00358360 0.00276630 0.00165340 0.00429200
## 18      lprF 0.00075942 0.00098214 0.00074297 0.00038954 0.00038982
## 19      lprG 0.00123770 0.00038016 0.00105640 0.00129240 0.00000000
## 20      lpqH 0.00216510 0.00306320 0.00348450 0.00159860 0.00201110
## 21      rp1B 0.00175110 0.00146480 0.00148400 0.00123460 0.00197260
## 22      rp1V 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 23      Rv1006 0.00160070 0.00092679 0.00092829 0.00121930 0.00084593
## 24      fumC 0.00301520 0.00470490 0.00333130 0.00212350 0.00251440
## 25      proC 0.00339480 0.00404060 0.00497700 0.00327410 0.00438500
## 26      Rv2969c 0.00032728 0.00060315 0.00076045 0.00027909 0.00062698
## 27      metC 0.00195170 0.00185540 0.00185090 0.00142650 0.00152140
## 28      cfp29 0.00716460 0.00769010 0.00585400 0.00671400 0.00767870
## 29      prcA 0.00231360 0.00335930 0.00385370 0.00159880 0.00216850
## 30      glnA4 0.00237400 0.00258020 0.00257620 0.00215800 0.00213090
## 31      rp1T 0.00283040 0.00268260 0.00268430 0.00315250 0.00191540
## 32      nat 0.00062666 0.00090579 0.00063627 0.00075443 0.00071903
## 33      lprQ 0.00053201 0.00053996 0.00079851 0.00051849 0.00090237
## 34      Rv2857c 0.00088955 0.00094388 0.00091267 0.00066991 0.00123940
## 35      Rv2141c 0.00135060 0.00140180 0.00154590 0.00138430 0.00204390
## 36      pstS3 0.00115600 0.00114310 0.00134770 0.00101670 0.00145350
## 37      Rv3510c 0.00052535 0.00055325 0.00074736 0.00051200 0.00062739
## 38      caeA 0.00020062 0.00012324 0.00023973 0.00025417 0.00025156
## 39      moaE2 0.00125780 0.00099990 0.00088411 0.00100950 0.00061849
## 40      Rv3722c 0.00338140 0.00383030 0.00410760 0.00334220 0.00457760
## 41      hisB 0.00163930 0.00152580 0.00158300 0.00159770 0.00138420
## 42      Rv3210c 0.00054192 0.00049936 0.00017988 0.00035210 0.00075504
## 43      ppa 0.00283340 0.00387670 0.00401850 0.00345170 0.00349910
## 44      Rv0296c 0.00213130 0.00220510 0.00184680 0.00229580 0.00259430
## 45      thyX 0.00083456 0.00097408 0.00121890 0.00089469 0.00162790
## 46      nrdF2 0.00122350 0.00118670 0.00141080 0.00103550 0.00139070
## 47      Rv2895c 0.00195370 0.00144930 0.00166410 0.00183220 0.00215710
## 48      dapA 0.00312960 0.00367420 0.00346280 0.00298230 0.00450570
## 49      fbpC 0.00340580 0.00614460 0.00672180 0.00308000 0.00666880
## 50      folB 0.00078436 0.00077094 0.00062486 0.00114660 0.00098354
## 51      glpX 0.00051872 0.00024784 0.00034436 0.00056171 0.00000000
## 52      aldC 0.00210930 0.00267600 0.00234400 0.00176520 0.00313050
## 53      pgi 0.00569710 0.00704580 0.00631190 0.00579130 0.00814780
## 54      fadA3 0.00690320 0.00968390 0.00896040 0.00692860 0.01076600
## 55      mycP3 0.00047521 0.00072286 0.00087133 0.00055135 0.00091432
## 56      mpt53 0.00235170 0.00274120 0.00424340 0.00364360 0.00319260
## 57      Rv0787 0.00016351 0.00016071 0.00030394 0.00025497 0.00018225
## 58      tyrS 0.00071351 0.00060457 0.00035934 0.00064742 0.00065131
## 59      Rv0968 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 60      argC 0.00041491 0.00021847 0.00000000 0.00000000 0.00000000
## 61      rp1D 0.00112270 0.00132190 0.00037267 0.00036473 0.00143390
## 62      lppK 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 63      vapC11 0.00140130 0.00086083 0.00072356 0.00136570 0.00000000
## 64      lppX 0.00322360 0.00440060 0.00451790 0.00305440 0.00411710
## 65      pyrB 0.00062134 0.00044196 0.00043420 0.00028684 0.00000000
## 66      Rv0999 0.00012419 0.00040688 0.00054965 0.00000000 0.00000000
## 67      prs 0.00307200 0.00491440 0.00297420 0.00252610 0.00383430
## 68      pta 0.00010583 0.00068728 0.00026096 0.00010314 0.00035810
## 69      rocA 0.00117190 0.00205350 0.00201520 0.00074894 0.00131160
## 70      Rv0799c 0.00121450 0.00153040 0.00066154 0.00115330 0.00151850
## 71      csoR 0.00096431 0.00129250 0.00000000 0.00000000 0.00000000
## 72      glnA2 0.00175430 0.00204040 0.00167700 0.00145890 0.00172720
## 73      Rv0227c 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 74      ppiB 0.00033870 0.00062420 0.00152900 0.00039611 0.00070785
## 75      Rv2575 0.00078329 0.00078738 0.00094547 0.00069399 0.00099212
## 76      Rv0161 0.00144050 0.00139870 0.00117230 0.00142650 0.00184510
## 77      punA 0.00093421 0.00062171 0.00062020 0.00098634 0.00097620
## 78      Rv3668c 0.00062952 0.00044196 0.00071643 0.00087646 0.00056384
## 79      eccB5 0.00055665 0.00035462 0.00041060 0.00048222 0.00031597
## 80      mmaA4 0.00083179 0.00080904 0.00059822 0.00060799 0.00091747

```

```

## 81    Rv2250A 0.00165110 0.00101430 0.00119580 0.00197490 0.00167300
## 82      rpiB 0.00238260 0.00181970 0.00222300 0.00282410 0.00242240
## 83      ica 0.00211700 0.00300840 0.00281090 0.00191410 0.00319830
## 84    Rv1700 0.00055436 0.00043342 0.00020074 0.00049115 0.00070215
## 85      adk 0.00351580 0.00354060 0.00306100 0.00426900 0.00297120
## 86    Rv1836c 0.00041605 0.00018932 0.00045011 0.00049558 0.00025763
## 87    Rv0398c 0.00127340 0.00162470 0.00182080 0.00124100 0.00177420
## 88      gpm2 0.00185000 0.00170470 0.00197870 0.00175290 0.00264920
## 89      pat 0.00132990 0.00087140 0.00102020 0.00155530 0.00139990
## 90      mpt70 0.00135130 0.00066409 0.00114830 0.00136960 0.00075309
## 91      tpiA 0.00463650 0.00417410 0.00403330 0.00479130 0.00551310
## 92      mmpR5 0.00132770 0.00093214 0.00159500 0.00147880 0.00220220
## 93    Rv2799 0.00064888 0.00091987 0.00086155 0.00072968 0.00090407
## 94    Rv2140c 0.00675710 0.00415090 0.00464330 0.00693200 0.00487240
## 95      garA 0.00315540 0.00284820 0.00384750 0.00395380 0.00278130
## 96      dppA 0.00030853 0.00045013 0.00043525 0.00026310 0.00064479
## 97      ephB 0.00102560 0.00064804 0.00054470 0.00094244 0.00061241
## 98      hrp1 0.00102130 0.00197180 0.00096861 0.00142190 0.00203280
## 99    Rv0457c 0.00141060 0.00158070 0.00063801 0.00137470 0.00205170
## 100     dhaA 0.00156480 0.00081174 0.00032319 0.00145730 0.00116280
## 101    Rv1531 0.00116530 0.00068175 0.00088411 0.00162240 0.00108240
## 102    Rv0546c 0.00179300 0.00050066 0.00054106 0.00174740 0.00090841
## 103     fecB 0.00107520 0.00260620 0.00281650 0.00110450 0.00283400
## 104    cyp142 0.00110090 0.00045084 0.00038282 0.00104730 0.00043823
## 105     glgB 0.00028542 0.00068380 0.00037896 0.00038943 0.00101400
## 106     pckG 0.00383890 0.00507600 0.00578270 0.00436200 0.00645180
## 107     trxB 0.00021798 0.00042085 0.00078558 0.00021244 0.00043387
## 108      mak 0.00082539 0.00067605 0.00082193 0.00071504 0.00079860
## 109     subI 0.00105490 0.00010801 0.00077815 0.00105670 0.00061241
## 110     cfp32 0.00247810 0.00333930 0.00392710 0.00288260 0.00350840
## 111    Rv0526 0.00091763 0.00154280 0.00153900 0.00098845 0.00148040
## 112     cmaA2 0.00110540 0.00059416 0.00032105 0.00097629 0.00057753
## 113     TB22 0.00335480 0.00485570 0.00640690 0.00398610 0.00493020
## 114     mpt64 0.01061500 0.01242300 0.01616000 0.01221800 0.01453500
## 115     gpgP 0.00042102 0.00022990 0.00031056 0.00050151 0.00045624
## 116     map 0.00032943 0.00053966 0.00048600 0.00000000 0.00045899
## 117     mtc28 0.00037017 0.00157110 0.00098298 0.00029517 0.00150030
## 118     trxA 0.00197850 0.00165740 0.00298510 0.00254170 0.00162890
## 119     espB 0.00183690 0.00195040 0.00198730 0.00183450 0.00151670
## 120     gcvP 0.00072060 0.00144380 0.00085373 0.00071309 0.00129750
## 121    Rv0315 0.00255480 0.00501340 0.00603040 0.00266280 0.00538870
## 122    Rv2765 0.00102190 0.00041851 0.00084802 0.00149390 0.00035595
## 123    Rv0148 0.00087542 0.00094110 0.00072645 0.00117310 0.00066066
## 124    Rv0331 0.00083349 0.00029730 0.00024989 0.00086471 0.00037460
## 125     deoC 0.00046572 0.00022887 0.00018551 0.00045388 0.00051909
## 126     purU 0.00077399 0.00111630 0.00089362 0.00029517 0.00032820
## 127     lpqG 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 128     vapC4 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 129    Rv1265 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 130    Rv1762c 0.00047780 0.00024460 0.00000000 0.00023283 0.00000000
## 131    Rv1287 0.00019439 0.00000000 0.00000000 0.00000000 0.00000000
## 132     pyk 0.00123770 0.00181930 0.00064560 0.00086160 0.00033873
## 133     dapD 0.00144800 0.00262810 0.00144190 0.00096217 0.00201740
## 134     dnaK 0.02230000 0.01417000 0.01371800 0.02734500 0.01818600
## 135     lpdC 0.01205100 0.01546900 0.01217900 0.01192000 0.01653900
## 136     sseC1 0.00073024 0.00089718 0.00083106 0.00000000 0.00029069
## 137     pepA 0.00052895 0.00054156 0.00035115 0.00048687 0.00020471
## 138    Rv0048c 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 139     arcA 0.00246530 0.00299700 0.00165390 0.00171980 0.00191630
##      S3_F1    S1_F2    S2_F2    S3_F2    S1_F3    S2_F3
## 1  0.00167590 1.7485e-03 0.00197430 2.4751e-03 0.00210420 0.00209380
## 2  0.00148140 1.6838e-03 0.00134000 1.1183e-03 0.00124640 0.00129940
## 3  0.00251560 1.8501e-03 0.00111620 1.2308e-03 0.00127320 0.00149180
## 4  0.00151220 1.1122e-03 0.00176380 1.1994e-03 0.00204100 0.00158810
## 5  0.00119040 1.6537e-03 0.00181450 1.4237e-03 0.00184470 0.00121810
## 6  0.00425080 4.3712e-03 0.00428740 5.5472e-03 0.00497570 0.00404180
## 7  0.00000000 5.3598e-03 0.00499910 4.5106e-03 0.00762320 0.00643200
## 8  0.00497930 4.1774e-02 0.07541400 6.0543e-02 0.07131200 0.06510500
## 9  0.00112020 1.3799e-02 0.01140700 1.7242e-02 0.02033500 0.01177800

```

```
## 10 0.00000000 3.3463e-03 0.00240090 2.5448e-03 0.00445540 0.00239640
## 11 0.00166910 1.8191e-03 0.00072153 1.3853e-03 0.00230700 0.00138900
## 12 0.01030100 5.8026e-03 0.00716980 7.4702e-03 0.00571890 0.00616720
## 13 0.00486070 2.9358e-03 0.00309760 3.0078e-03 0.00304260 0.00400070
## 14 0.00302090 1.4596e-03 0.00222420 1.8149e-03 0.00111420 0.00188710
## 15 0.00117980 4.3382e-04 0.00039614 0.0000e+00 0.00000000 0.00057617
## 16 0.00014002 9.5255e-04 0.00059106 8.6661e-04 0.00113390 0.00069849
## 17 0.00194150 5.7592e-03 0.00334650 7.1286e-03 0.00713350 0.00526470
## 18 0.00017382 1.9175e-03 0.00311830 4.0537e-03 0.00430110 0.00426870
## 19 0.00044854 4.0999e-03 0.00405730 4.4831e-03 0.00752420 0.00422920
## 20 0.00275820 7.8341e-03 0.01535600 1.5356e-02 0.02143700 0.01956200
## 21 0.00205230 3.4557e-03 0.00313470 3.8368e-03 0.00583160 0.00306720
## 22 0.00000000 7.3392e-04 0.00121510 1.5699e-03 0.00113970 0.00212080
## 23 0.00082679 1.8634e-03 0.00149170 1.8660e-03 0.00237580 0.00180120
## 24 0.00181850 6.4055e-03 0.00400650 4.8420e-03 0.00641590 0.00528860
## 25 0.00522870 5.2781e-03 0.00589660 7.8903e-03 0.00747230 0.00653060
## 26 0.00094885 1.3957e-03 0.00156460 2.2980e-03 0.00256130 0.00218460
## 27 0.00161660 2.7495e-03 0.00184820 2.5739e-03 0.00322750 0.00186100
## 28 0.00616300 4.9901e-02 0.05275400 3.5994e-02 0.01825400 0.01471500
## 29 0.00213420 4.8433e-03 0.00521230 4.2662e-03 0.00526720 0.00505410
## 30 0.00191920 2.6527e-03 0.00220000 2.1371e-03 0.00321560 0.00304740
## 31 0.00222730 7.3282e-03 0.00321650 4.5425e-03 0.00743640 0.00521800
## 32 0.00064123 5.8949e-04 0.00022556 3.4510e-04 0.00000000 0.00000000
## 33 0.00080473 3.9456e-04 0.00031846 5.4137e-04 0.00022628 0.00030880
## 34 0.00134810 3.0175e-04 0.00098968 1.0094e-03 0.00000000 0.00000000
## 35 0.00165400 7.6958e-04 0.00142490 1.2353e-03 0.00018224 0.00020724
## 36 0.00155310 9.0176e-04 0.00081950 7.0388e-04 0.00071712 0.00031367
## 37 0.00054397 5.2008e-04 0.00074627 7.6117e-04 0.00029368 0.00050096
## 38 0.00017449 8.5551e-05 0.00033759 1.8781e-04 0.00000000 0.00000000
## 39 0.00117980 8.6765e-04 0.00056591 5.7721e-04 0.00000000 0.00000000
## 40 0.00497120 3.0680e-03 0.00264140 2.6567e-03 0.00220530 0.00266800
## 41 0.00165620 1.0062e-03 0.00113990 2.0153e-03 0.00000000 0.00000000
## 42 0.00052372 5.2960e-04 0.00027634 1.4093e-04 0.00000000 0.00000000
## 43 0.00513410 2.3342e-03 0.00453150 4.0191e-03 0.00088193 0.00071640
## 44 0.00247160 1.6264e-03 0.00209350 1.1902e-03 0.00074619 0.00144760
## 45 0.00096783 5.7833e-04 0.00089368 7.1620e-04 0.00040821 0.00064992
## 46 0.00154020 1.0984e-03 0.00044329 8.5405e-04 0.00044097 0.00042984
## 47 0.00187020 6.2879e-04 0.00157890 1.2654e-03 0.00050485 0.00155840
## 48 0.00393180 2.0019e-03 0.00425560 2.8214e-03 0.00170090 0.00239850
## 49 0.00604890 2.6169e-03 0.00427130 3.3991e-03 0.00252130 0.00389130
## 50 0.00102330 6.6897e-04 0.00095992 7.3431e-04 0.00000000 0.00104710
## 51 0.00045952 3.6867e-04 0.00039676 5.8454e-04 0.00028191 0.00000000
## 52 0.00312420 1.3444e-03 0.00143800 1.1090e-03 0.00188400 0.00224460
## 53 0.00795770 4.4648e-03 0.00372270 4.2974e-03 0.00195620 0.00402940
## 54 0.01075400 3.8720e-03 0.00528010 4.2602e-03 0.00317500 0.00590310
## 55 0.00095129 4.8250e-05 0.00010385 0.0000e+00 0.00000000 0.00000000
## 56 0.00454540 0.0000e+00 0.00083022 0.0000e+00 0.00000000 0.00093918
## 57 0.00033184 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 58 0.00057065 1.1541e-03 0.00101620 8.0618e-04 0.00115530 0.00076641
## 59 0.00000000 2.2697e-03 0.00244260 1.9931e-03 0.00208270 0.00284220
## 60 0.00000000 1.6430e-03 0.00113340 1.9422e-03 0.00168150 0.00098912
## 61 0.00101720 1.9949e-03 0.00143130 1.5328e-03 0.00274580 0.00156130
## 62 0.00000000 9.4152e-04 0.00084437 1.1196e-03 0.00118790 0.00135090
## 63 0.00000000 1.8259e-03 0.00226280 2.5509e-03 0.00198010 0.00311790
## 64 0.00467300 5.8711e-03 0.01726000 1.3972e-02 0.01270200 0.01364800
## 65 0.00009481 2.1267e-03 0.00085046 2.9595e-03 0.00262330 0.00101870
## 66 0.00066010 5.7374e-04 0.00050662 7.7511e-04 0.00097193 0.00036843
## 67 0.00236580 4.7079e-03 0.00528690 5.4923e-03 0.00457040 0.00647920
## 68 0.00000000 8.0592e-04 0.00048570 9.9079e-04 0.00073951 0.00097555
## 69 0.00155960 1.8639e-03 0.00182220 1.7986e-03 0.00210490 0.00235100
## 70 0.00099310 4.0503e-03 0.00438270 4.7131e-03 0.00219340 0.00221720
## 71 0.00000000 1.9626e-03 0.00201160 2.1885e-03 0.00291580 0.00448620
## 72 0.00115280 3.0422e-03 0.00275520 2.1533e-03 0.00297460 0.00301850
## 73 0.00000000 0.0000e+00 0.00030325 4.6396e-04 0.00053329 0.00049620
## 74 0.00127660 1.1555e-03 0.00098446 2.0611e-03 0.00238560 0.00218550
## 75 0.00087740 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 76 0.00181870 7.1833e-04 0.00042651 4.7128e-04 0.00045458 0.00031017
## 77 0.00067712 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 78 0.00091255 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
```



```
## 79 0.00035863 1.0990e-04 0.00000000 0.0000e+00 0.00000000 0.00000000
## 80 0.00055264 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 81 0.00141430 6.4010e-04 0.00000000 0.0000e+00 0.00000000 0.00000000
## 82 0.00289380 0.0000e+00 0.00029553 0.0000e+00 0.00000000 0.00000000
## 83 0.00247720 5.9823e-04 0.00081939 1.1143e-03 0.00024952 0.00039726
## 84 0.00043833 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 85 0.00509650 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 86 0.00042441 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 87 0.00191690 0.0000e+00 0.00014985 0.0000e+00 0.00000000 0.00000000
## 88 0.00268180 4.9308e-04 0.00055030 5.6128e-04 0.00000000 0.00034302
## 89 0.00149940 7.8765e-04 0.00022604 5.5333e-04 0.00023128 0.00000000
## 90 0.00101860 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 91 0.00515660 2.4289e-03 0.00342410 2.9312e-03 0.00117300 0.00186760
## 92 0.00137480 8.0885e-04 0.00106390 0.0000e+00 0.00000000 0.00000000
## 93 0.00094062 0.0000e+00 0.00038178 0.0000e+00 0.00000000 0.00000000
## 94 0.00472570 1.2006e-03 0.00145080 3.6994e-04 0.00069581 0.00026376
## 95 0.00336050 3.4326e-04 0.00098510 0.0000e+00 0.00000000 0.00071640
## 96 0.00030748 1.4390e-04 0.00011799 0.0000e+00 0.00000000 0.00000000
## 97 0.00072213 4.3737e-04 0.00013448 9.1445e-05 0.00000000 0.00000000
## 98 0.00126900 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 99 0.00071904 2.1483e-04 0.00018970 0.0000e+00 0.00000000 0.00000000
## 100 0.00060489 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 101 0.00096525 6.5074e-04 0.00000000 0.0000e+00 0.00000000 0.00000000
## 102 0.00094514 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 103 0.00303290 2.7882e-04 0.00048898 4.5341e-04 0.00039798 0.00071121
## 104 0.00072192 2.7944e-04 0.00000000 0.0000e+00 0.00000000 0.00000000
## 105 0.00059993 2.5864e-04 0.00028381 2.8947e-04 0.00000000 0.00031753
## 106 0.00553980 1.4499e-03 0.00186970 1.9877e-03 0.00127990 0.00310250
## 107 0.00076740 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 108 0.00073119 5.1331e-04 0.00000000 0.0000e+00 0.00031401 0.00035710
## 109 0.00114690 3.4365e-04 0.00000000 1.8289e-04 0.00057333 0.00000000
## 110 0.00393990 4.6873e-04 0.00140630 9.9784e-04 0.00101660 0.00115610
## 111 0.00245040 4.1191e-04 0.00044329 3.7679e-04 0.00000000 0.00000000
## 112 0.00025037 7.3653e-05 0.00000000 0.0000e+00 0.00000000 0.00000000
## 113 0.00712810 9.7988e-04 0.00274180 1.5058e-03 0.00116890 0.00265860
## 114 0.01777500 4.3901e-03 0.00748930 6.7108e-03 0.00492360 0.00895870
## 115 0.00000000 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 116 0.00026530 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 117 0.00112200 0.0000e+00 0.00010296 0.0000e+00 0.00000000 0.00000000
## 118 0.00208580 0.0000e+00 0.00082544 0.0000e+00 0.00000000 0.00140070
## 119 0.00167660 1.2572e-03 0.00142240 9.2002e-04 0.00110930 0.00105960
## 120 0.00094816 5.2004e-04 0.00071229 4.4974e-04 0.00030366 0.00066600
## 121 0.00653240 4.1612e-04 0.00211700 2.1039e-03 0.00048596 0.00181580
## 122 0.00037034 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 123 0.00079313 8.1663e-04 0.00039059 0.0000e+00 0.00049956 0.00000000
## 124 0.00019487 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 125 0.00000000 0.0000e+00 0.00000000 0.0000e+00 0.00000000 0.00000000
## 126 0.00000000 4.6639e-04 0.00061775 5.2507e-04 0.00000000 0.00014975
## 127 0.00000000 4.6340e-04 0.00053195 3.3911e-04 0.00059530 0.00067699
## 128 0.00000000 1.1977e-03 0.00000000 1.5025e-03 0.00062801 0.00124980
## 129 0.00053530 6.8895e-04 0.00049429 7.9226e-04 0.00063218 0.00000000
## 130 0.00000000 1.6980e-03 0.00207100 1.6153e-03 0.00000000 0.00000000
## 131 0.00000000 1.5888e-03 0.00000000 2.0220e-03 0.00291580 0.00187420
## 132 0.00019223 2.5448e-03 0.00148770 7.2420e-04 0.00250810 0.00177030
## 133 0.00047704 2.4208e-03 0.00317160 2.1566e-03 0.00354120 0.00512550
## 134 0.01625900 2.3916e-02 0.01585600 1.2293e-02 0.02475400 0.02180000
## 135 0.01671900 6.7593e-03 0.01324200 1.5435e-02 0.00989730 0.01675800
## 136 0.00000000 4.4487e-04 0.00000000 0.0000e+00 0.00000000 0.00000000
## 137 0.00000000 0.0000e+00 0.00035963 0.0000e+00 0.00000000 0.00000000
## 138 0.00000000 1.5393e-03 0.00127010 1.8023e-03 0.00113000 0.00000000
## 139 0.00033856 3.7072e-03 0.00254070 1.5386e-03 0.00324940 0.00369530
##      S3_F3      S1_F4      S2_F4      S3_F4      S1_F5      S2_F5
## 1 0.00202400 6.6765e-04 0.00060296 0.00000000 0.00039171 0.00000000
## 2 0.00140500 7.9099e-04 0.00049607 0.00000000 0.00058009 0.00008249
## 3 0.00157730 8.8145e-04 0.00078621 0.00000000 0.00000000 0.00030642
## 4 0.00116250 1.3634e-03 0.00095768 0.00000000 0.00000000 0.00000000
## 5 0.00085858 1.5105e-03 0.00045471 0.00000000 0.00000000 0.00056709
## 6 0.00592160 4.7041e-03 0.00517300 0.00663720 0.00589790 0.00653210
## 7 0.00502650 8.7390e-03 0.00657690 0.00548840 0.00769080 0.00624940
```

8 0.05895800 7.5345e-02 0.06926500 0.09761500 0.07729000 0.06286100
9 0.01690600 1.5159e-02 0.00904980 0.02217400 0.01418500 0.00984570
10 0.00311290 3.5915e-03 0.00153360 0.00287950 0.00367630 0.00114760
11 0.00218650 1.5502e-03 0.00096787 0.00000000 0.00044464 0.00000000
12 0.00580920 7.5086e-03 0.00803690 0.00282940 0.00763590 0.00861370
13 0.00327720 3.4593e-03 0.00330980 0.00404200 0.00311520 0.00347340
14 0.00142510 2.0158e-03 0.00268700 0.00204070 0.00236540 0.00312510
15 0.00000000 7.3489e-04 0.00138270 0.00000000 0.00043116 0.00137950
16 0.00073850 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
17 0.00812200 4.9149e-03 0.00611850 0.00919060 0.00472650 0.00665950
18 0.00545360 3.4738e-03 0.00338620 0.00374000 0.00221280 0.00236000
19 0.00592730 5.2688e-03 0.00341450 0.00468770 0.00309120 0.00233520
20 0.02376900 2.0528e-02 0.01340600 0.01596200 0.01089700 0.00999070
21 0.00464530 5.7361e-03 0.00269230 0.00581040 0.00293110 0.00347340
22 0.00211780 1.3150e-03 0.00105560 0.00198200 0.00030860 0.00148110
23 0.00229400 2.0103e-03 0.00142120 0.00137730 0.00107220 0.00000000
24 0.00595400 5.0826e-03 0.00361940 0.00837480 0.00448900 0.00362490
25 0.00881810 6.4103e-03 0.00625620 0.00860330 0.00618240 0.00472540
26 0.00192480 1.8286e-03 0.00183490 0.00331760 0.00119200 0.00177990
27 0.00267820 2.7116e-03 0.00202630 0.00260890 0.00230180 0.00093863
28 0.02852300 2.8055e-02 0.02864300 0.03388900 0.05884400 0.04012600
29 0.00583840 5.6406e-03 0.00524080 0.00813460 0.00576070 0.00562100
30 0.00359790 3.5711e-03 0.00216140 0.00313280 0.00319270 0.00227000
31 0.00513650 9.2374e-03 0.00503760 0.01008900 0.00589090 0.00578010
32 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
33 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
34 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
35 0.00000000 4.0476e-04 0.00029011 0.00000000 0.00054280 0.00123020
36 0.00072960 0.0000e+00 0.00070255 0.00052765 0.00000000 0.00000000
37 0.00000000 0.0000e+00 0.00028051 0.00000000 0.00000000 0.00000000
38 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
39 0.00000000 5.5117e-04 0.00000000 0.00000000 0.00000000 0.00000000
40 0.00174890 1.8461e-03 0.00239030 0.00000000 0.00160720 0.00163960
41 0.00000000 1.3569e-03 0.00000000 0.00000000 0.00000000 0.00000000
42 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
43 0.00000000 1.4392e-03 0.00112320 0.00000000 0.00150110 0.00280160
44 0.00121390 8.3564e-04 0.00106210 0.00000000 0.00111130 0.00000000
45 0.00019633 0.0000e+00 0.00083182 0.00000000 0.00000000 0.00025935
46 0.00000000 7.9953e-05 0.00064183 0.00000000 0.00000000 0.00020012
47 0.00000000 9.1536e-04 0.00165330 0.00000000 0.00000000 0.00045822
48 0.00122700 7.7714e-04 0.00216620 0.00000000 0.00172250 0.00237740
49 0.00317590 1.7524e-03 0.00290520 0.00095701 0.00107280 0.00200230
50 0.00000000 3.8955e-04 0.00000000 0.00000000 0.00000000 0.00000000
51 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
52 0.00210350 1.0817e-03 0.00222810 0.00000000 0.00060126 0.00121120
53 0.00217450 4.1691e-03 0.00446560 0.00070608 0.00461720 0.00644860
54 0.00345390 6.0125e-03 0.00750940 0.00337430 0.00945680 0.00920530
55 0.00000000 4.4954e-04 0.00000000 0.00000000 0.00019781 0.00000000
56 0.00000000 0.0000e+00 0.00135230 0.00000000 0.00000000 0.00000000
57 0.00000000 2.4362e-04 0.00000000 0.00000000 0.00000000 0.00000000
58 0.00052092 4.8877e-04 0.00067438 0.00000000 0.00043014 0.00000000
59 0.00225380 1.3217e-03 0.00000000 0.00000000 0.00000000 0.00000000
60 0.00104580 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
61 0.00242110 6.9699e-04 0.00000000 0.00000000 0.00000000 0.00000000
62 0.00155820 1.2336e-03 0.00000000 0.00000000 0.00000000 0.00000000
63 0.00293030 1.3532e-03 0.00000000 0.00000000 0.00000000 0.00000000
64 0.01959100 9.1167e-03 0.00803260 0.01145100 0.00626200 0.00556540
65 0.00300030 9.7448e-04 0.00024446 0.00000000 0.00019058 0.00000000
66 0.00126600 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
67 0.00504370 2.0660e-03 0.00358820 0.00179660 0.00149190 0.00179000
68 0.00117370 3.7543e-04 0.00011302 0.00075451 0.00022027 0.00023492
69 0.00271170 5.2478e-04 0.00167550 0.00119850 0.00033588 0.00167170
70 0.00205120 2.3198e-03 0.00248300 0.00446790 0.00680530 0.00832240
71 0.00453700 3.7007e-03 0.00436880 0.00437490 0.00178810 0.00000000
72 0.00286130 2.7880e-03 0.00238960 0.00437740 0.00238540 0.00247140
73 0.00075780 5.5378e-04 0.00055570 0.00108200 0.00064981 0.00000000
74 0.00342620 2.3550e-03 0.00143470 0.00211290 0.00148040 0.00094730
75 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
76 0.00000000 2.3078e-04 0.00000000 0.00000000 0.00000000 0.00000000

```
## 77 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 78 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 79 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 80 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 81 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 82 0.00000000 1.5991e-03 0.00096275 0.00000000 0.00000000 0.00000000
## 83 0.00000000 5.7003e-04 0.00108040 0.00000000 0.00000000 0.00000000
## 84 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 85 0.00000000 8.5872e-04 0.00244140 0.00000000 0.00000000 0.00107470
## 86 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 87 0.00000000 7.2971e-04 0.00000000 0.00000000 0.00042813 0.00000000
## 88 0.00000000 7.6566e-04 0.00000000 0.00000000 0.00000000 0.00111790
## 89 0.00000000 0.0000e+00 0.00044183 0.00000000 0.00000000 0.00064286
## 90 0.00000000 5.3689e-04 0.00000000 0.00000000 0.00000000 0.00000000
## 91 0.00094027 2.6798e-03 0.00219110 0.00000000 0.00244570 0.00186310
## 92 0.00000000 3.1400e-04 0.00000000 0.00000000 0.00000000 0.00000000
## 93 0.00000000 0.0000e+00 0.00062187 0.00000000 0.00000000 0.00000000
## 94 0.00000000 2.7965e-03 0.00280620 0.00000000 0.00138170 0.00092099
## 95 0.00000000 6.3963e-04 0.00144410 0.00000000 0.00000000 0.00220130
## 96 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 97 0.00000000 2.9107e-04 0.00000000 0.00000000 0.00000000 0.00000000
## 98 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 99 0.00000000 3.0793e-04 0.00050212 0.00000000 0.00000000 0.00000000
## 100 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 101 0.00000000 0.0000e+00 0.00096787 0.00000000 0.00000000 0.00000000
## 102 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 103 0.00075195 3.6079e-04 0.00108610 0.00000000 0.00000000 0.00000000
## 104 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 105 0.00023500 0.0000e+00 0.00000000 0.00000000 0.00016633 0.00000000
## 106 0.00149840 3.2488e-03 0.00476130 0.00204040 0.00321020 0.00470770
## 107 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 108 0.00000000 0.0000e+00 0.00022852 0.00000000 0.00000000 0.00000000
## 109 0.00020681 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 110 0.00056416 9.9252e-04 0.00308740 0.00000000 0.00128110 0.00273260
## 111 0.00079531 0.0000e+00 0.00072206 0.00000000 0.00000000 0.00000000
## 112 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 113 0.00183790 0.0000e+00 0.00332080 0.00000000 0.00000000 0.00199940
## 114 0.00495130 7.3851e-03 0.01162900 0.00428140 0.00746590 0.01094800
## 115 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 116 0.00000000 0.0000e+00 0.00036483 0.00000000 0.00000000 0.00000000
## 117 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 118 0.00000000 1.5632e-03 0.00000000 0.00000000 0.00000000 0.00000000
## 119 0.00069355 8.4472e-04 0.00129970 0.00000000 0.00059472 0.00126860
## 120 0.00041728 1.6517e-04 0.00044198 0.00000000 0.00029072 0.00044787
## 121 0.00125210 2.1147e-03 0.00247560 0.00000000 0.00113730 0.00121290
## 122 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 123 0.00000000 2.7173e-04 0.00000000 0.00000000 0.00000000 0.00000000
## 124 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 125 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 126 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 127 0.00112480 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 128 0.00075511 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 129 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 130 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 131 0.00274370 6.4360e-04 0.00000000 0.00000000 0.00000000 0.00000000
## 132 0.00103990 5.4883e-04 0.00121160 0.00000000 0.00064400 0.00020605
## 133 0.00332890 2.5333e-03 0.00328000 0.00184760 0.00153420 0.00245440
## 134 0.02454100 3.4070e-02 0.02732500 0.03404800 0.03978300 0.02998100
## 135 0.01227000 1.7195e-02 0.02100800 0.02075700 0.02233900 0.02096000
## 136 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 137 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 138 0.00000000 0.0000e+00 0.00000000 0.00000000 0.00000000 0.00000000
## 139 0.00183140 1.6754e-03 0.00142260 0.00113320 0.00128540 0.00120970
##      S3_F5      S1_qEV      S2_qEV      S3_qEV
## 1 5.5432e-04 0.00142010 0.00371180 0.00293550
## 2 4.9254e-04 0.00119170 0.00255030 0.00219130
## 3 0.0000e+00 0.00052080 0.00257530 0.00094527
## 4 0.0000e+00 0.00203000 0.00194620 0.00102350
## 5 0.0000e+00 0.00096386 0.00119150 0.00089091
```

```
## 6 4.7081e-03 0.00280990 0.00227540 0.00290240
## 7 5.1826e-03 0.00697060 0.00515850 0.00870230
## 8 5.3507e-02 0.08281900 0.05779200 0.05234200
## 9 1.2586e-02 0.02061200 0.01066800 0.01944600
## 10 2.2840e-03 0.00471360 0.00281310 0.00335990
## 11 1.7160e-04 0.00080599 0.00098344 0.00018471
## 12 6.8575e-03 0.00399280 0.00376070 0.00322090
## 13 2.1374e-03 0.00222460 0.00187360 0.00202740
## 14 1.5987e-03 0.00118390 0.00090415 0.00109700
## 15 6.1015e-04 0.00000000 0.00000000 0.00000000
## 16 0.0000e+00 0.00012755 0.00112630 0.00096459
## 17 4.5409e-03 0.00294760 0.00141590 0.00150590
## 18 1.3185e-03 0.00337780 0.00343000 0.00436400
## 19 2.7340e-03 0.00583690 0.00445310 0.00459080
## 20 6.7634e-03 0.01680700 0.01285200 0.02271300
## 21 2.1508e-03 0.00511650 0.00493490 0.00595290
## 22 0.0000e+00 0.00111880 0.00158060 0.00211530
## 23 0.0000e+00 0.00150630 0.00120130 0.00205780
## 24 4.2652e-03 0.00639350 0.00812960 0.00826380
## 25 5.8326e-03 0.00691090 0.00818050 0.00847540
## 26 1.3495e-03 0.00226890 0.00129750 0.00294140
## 27 1.8202e-03 0.00294530 0.00316420 0.00309360
## 28 5.2430e-02 0.04834300 0.03804200 0.02432100
## 29 5.3769e-03 0.00766520 0.00926000 0.00806530
## 30 3.2944e-03 0.00343630 0.00425860 0.00340420
## 31 8.0029e-03 0.00832920 0.00482770 0.00602980
## 32 0.0000e+00 0.00000000 0.00000000 0.00000000
## 33 0.0000e+00 0.00000000 0.00000000 0.00000000
## 34 0.0000e+00 0.00000000 0.00000000 0.00000000
## 35 4.8008e-04 0.00030748 0.00000000 0.00031005
## 36 0.0000e+00 0.00037230 0.00068379 0.00060066
## 37 0.0000e+00 0.00000000 0.00014001 0.00000000
## 38 0.0000e+00 0.00000000 0.00000000 0.00000000
## 39 0.0000e+00 0.00000000 0.00055211 0.00000000
## 40 1.2855e-03 0.00120330 0.00125270 0.00108570
## 41 0.0000e+00 0.00000000 0.00074140 0.00000000
## 42 0.0000e+00 0.00000000 0.00000000 0.00000000
## 43 0.0000e+00 0.00153060 0.00060067 0.00068593
## 44 1.1101e-03 0.00088872 0.00133930 0.00107540
## 45 0.0000e+00 0.00000000 0.00000000 0.00000000
## 46 0.0000e+00 0.00000000 0.00126140 0.00077168
## 47 0.0000e+00 0.00000000 0.00013754 0.00000000
## 48 1.1471e-03 0.00064284 0.00207590 0.00074081
## 49 8.8561e-04 0.00129650 0.00297650 0.00228780
## 50 0.0000e+00 0.00000000 0.00073164 0.00000000
## 51 0.0000e+00 0.00000000 0.00016129 0.00000000
## 52 0.0000e+00 0.00090825 0.00098378 0.00109900
## 53 5.7561e-03 0.00224190 0.00186520 0.00376770
## 54 7.1161e-03 0.00414960 0.00273910 0.00459580
## 55 5.5985e-04 0.00035857 0.00059103 0.00036157
## 56 0.0000e+00 0.00079625 0.00461230 0.00176640
## 57 0.0000e+00 0.00025909 0.00024403 0.00000000
## 58 0.0000e+00 0.00019493 0.00032130 0.00000000
## 59 0.0000e+00 0.00196790 0.00178730 0.00170080
## 60 0.0000e+00 0.00078268 0.00199040 0.00173630
## 61 0.0000e+00 0.00197670 0.00192000 0.00224240
## 62 0.0000e+00 0.00131190 0.00113270 0.00102890
## 63 0.0000e+00 0.00164480 0.00305000 0.00290240
## 64 6.0923e-03 0.01253400 0.01445000 0.01633400
## 65 0.0000e+00 0.00146820 0.00262340 0.00313510
## 66 0.0000e+00 0.00076529 0.00092675 0.00110240
## 67 2.6390e-04 0.00388750 0.00949210 0.00724330
## 68 0.0000e+00 0.00079856 0.00205900 0.00124810
## 69 0.0000e+00 0.00208020 0.00347660 0.00296730
## 70 3.4669e-03 0.00592130 0.00511230 0.00348290
## 71 0.0000e+00 0.00439880 0.00310730 0.00560280
## 72 2.3147e-03 0.00358280 0.00397090 0.00429790
## 73 0.0000e+00 0.00052352 0.00064718 0.00112180
## 74 0.0000e+00 0.00214680 0.00164290 0.00279610
```

```

## 75 0.0000e+00 0.00000000 0.00000000 0.00000000
## 76 0.0000e+00 0.00000000 0.00000000 0.00000000
## 77 0.0000e+00 0.00000000 0.00000000 0.00000000
## 78 0.0000e+00 0.00000000 0.00000000 0.00000000
## 79 0.0000e+00 0.00000000 0.00000000 0.00000000
## 80 0.0000e+00 0.00000000 0.00019397 0.00000000
## 81 0.0000e+00 0.00000000 0.00000000 0.00000000
## 82 0.0000e+00 0.00000000 0.00000000 0.00000000
## 83 0.0000e+00 0.00026944 0.00033309 0.00000000
## 84 0.0000e+00 0.00000000 0.00000000 0.00000000
## 85 0.0000e+00 0.00000000 0.00000000 0.00000000
## 86 0.0000e+00 0.00000000 0.00000000 0.00000000
## 87 0.0000e+00 0.00000000 0.00018274 0.00065212
## 88 0.0000e+00 0.00000000 0.00000000 0.00000000
## 89 0.0000e+00 0.00000000 0.00011026 0.00000000
## 90 0.0000e+00 0.00000000 0.00000000 0.00000000
## 91 2.1425e-03 0.00063334 0.00111850 0.00170300
## 92 0.0000e+00 0.00000000 0.00000000 0.00000000
## 93 0.0000e+00 0.00000000 0.00000000 0.00000000
## 94 1.4664e-03 0.00046961 0.00088463 0.00110490
## 95 0.0000e+00 0.00000000 0.00000000 0.00000000
## 96 0.0000e+00 0.00000000 0.00000000 0.00000000
## 97 0.0000e+00 0.00023217 0.00000000 0.00000000
## 98 0.0000e+00 0.00000000 0.00122490 0.00000000
## 99 2.5566e-04 0.00000000 0.00000000 0.00000000
## 100 0.0000e+00 0.00000000 0.00000000 0.00000000
## 101 0.0000e+00 0.00000000 0.00000000 0.00000000
## 102 0.0000e+00 0.00000000 0.00000000 0.00000000
## 103 0.0000e+00 0.00038371 0.00059632 0.00046429
## 104 0.0000e+00 0.00000000 0.00024449 0.00000000
## 105 0.0000e+00 0.00000000 0.00000000 0.00000000
## 106 2.2005e-03 0.00181850 0.00208750 0.00187950
## 107 0.0000e+00 0.00000000 0.00000000 0.00000000
## 108 0.0000e+00 0.00000000 0.00068437 0.00000000
## 109 0.0000e+00 0.00000000 0.00000000 0.00000000
## 110 0.0000e+00 0.00000000 0.00000000 0.00000000
## 111 0.0000e+00 0.00000000 0.00090101 0.00000000
## 112 0.0000e+00 0.00000000 0.00025777 0.00000000
## 113 0.0000e+00 0.00109230 0.00222910 0.00220280
## 114 7.3579e-03 0.00471260 0.00486540 0.00791980
## 115 0.0000e+00 0.00000000 0.00000000 0.00000000
## 116 0.0000e+00 0.00000000 0.00000000 0.00000000
## 117 0.0000e+00 0.00000000 0.00031390 0.00000000
## 118 0.0000e+00 0.00071251 0.00151000 0.00000000
## 119 0.0000e+00 0.00053903 0.00088847 0.00048314
## 120 9.1425e-05 0.00017567 0.00062046 0.00038379
## 121 0.0000e+00 0.00131190 0.00198590 0.00236230
## 122 0.0000e+00 0.00000000 0.00015887 0.00000000
## 123 0.0000e+00 0.00038532 0.00081658 0.00000000
## 124 0.0000e+00 0.00000000 0.00000000 0.00000000
## 125 0.0000e+00 0.00000000 0.00000000 0.00000000
## 126 0.0000e+00 0.00000000 0.00000000 0.00000000
## 127 0.0000e+00 0.00000000 0.00072982 0.00046301
## 128 0.0000e+00 0.00000000 0.00000000 0.00000000
## 129 0.0000e+00 0.00073143 0.00077503 0.00122920
## 130 0.0000e+00 0.00210310 0.00252560 0.00000000
## 131 0.0000e+00 0.00136900 0.00193410 0.00155290
## 132 0.0000e+00 0.00245150 0.00358720 0.00288400
## 133 5.4278e-04 0.00347640 0.00534120 0.00420650
## 134 5.0724e-02 0.02508200 0.01301600 0.02329100
## 135 2.8553e-02 0.01781300 0.00935340 0.01544700
## 136 0.0000e+00 0.00000000 0.00000000 0.00000000
## 137 0.0000e+00 0.00000000 0.00010964 0.00000000
## 138 0.0000e+00 0.00000000 0.00026937 0.00048063
## 139 6.4202e-04 0.00328960 0.00624520 0.00539020

```

```
heatmap(as.matrix(df2 [,-1]), xlab = "Sample", ylab = "Protein")
```

7.5.26 Heatmaps: all proteins (Figure 3.14)

```
df <- read.csv("~/Documents/R/NSAHeatmapAll.csv")
print(df)
```

##	Alternate.ID	S1_100R	S1_F1	S1_F2	S1_F3	S1_F4
## 1	guaB1	1.2196e-03	1.0188e-03	1.6950e-03	2.1731e-03	1.1898e-03
## 2	alr	5.4052e-04	5.0044e-04	8.0675e-04	6.3452e-04	5.3689e-04
## 3	glbB	2.5961e-04	1.7311e-04	3.7873e-04	5.0792e-04	2.5447e-04
## 4	Rv2226	1.4641e-03	1.4269e-03	2.5365e-03	3.1431e-03	3.0298e-03
## 5	Rv1738	1.9976e-03	2.0550e-03	1.7747e-03	2.8227e-03	2.2047e-03
## 6	pca	1.3885e-04	1.2630e-04	1.2829e-04	1.2677e-04	1.8389e-04
## 7	htpG	9.6742e-04	9.8998e-04	9.7981e-04	5.3629e-04	4.8046e-04
## 8	grpE	2.5303e-03	3.5043e-03	2.2717e-03	4.9506e-03	3.0865e-03
## 9	cipB	2.4112e-03	2.2180e-03	2.2296e-03	2.1421e-03	1.8940e-03
## 10	Rv3075c	1.1214e-03	6.6234e-04	2.2098e-03	1.7951e-03	8.4381e-04
## 11	rp10	1.6434e-03	1.2535e-03	2.0567e-03	1.6776e-03	1.0646e-03
## 12	fabG4	1.9991e-03	1.8587e-03	2.5477e-03	2.0231e-03	6.2765e-04
## 13	rpoB	6.9075e-04	5.6962e-04	7.6473e-04	6.7573e-04	1.9791e-04
## 14	rpoC	7.6893e-04	5.9487e-04	1.7494e-03	1.6285e-03	4.9211e-04
## 15	tuf	2.8978e-04	2.3107e-04	3.0894e-04	3.0925e-04	3.2708e-04
## 16	accA3	1.1997e-03	1.3048e-03	1.0566e-03	1.5988e-03	9.0667e-04
## 17	wag31	1.1235e-03	1.0558e-03	5.1331e-03	4.4746e-03	2.1919e-03
## 18	rne	3.7218e-04	3.6272e-04	7.9357e-04	1.2850e-04	5.4365e-05
## 19	mraZ	4.3771e-04	0.0000e+00	2.5665e-03	1.7128e-03	1.6304e-03
## 20	ettA	7.6651e-04	1.6398e-04	5.9794e-04	3.6578e-04	0.0000e+00
## 21	menB	1.8605e-03	1.4894e-03	1.4876e-03	2.6651e-03	1.6500e-03
## 22	echA21	2.1702e-03	1.9295e-03	2.1107e-03	2.9796e-03	3.0254e-03
## 23	dapB	0.0000e+00	0.0000e+00	6.3552e-04	3.3323e-04	0.0000e+00
## 24	cbs	1.1241e-04	1.7529e-04	2.3969e-04	0.0000e+00	0.0000e+00
## 25	glyA1	3.1201e-03	2.4837e-03	3.6564e-03	3.8677e-03	2.8389e-03
## 26	Rv0458	2.0576e-05	0.0000e+00	1.0968e-04	4.0257e-05	0.0000e+00
## 27	echA8	6.4947e-04	3.5604e-04	9.9532e-04	1.6678e-03	1.7135e-03
## 28	accA2	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
## 29	desA1	4.9382e-04	5.7151e-04	1.1187e-03	4.2270e-04	0.0000e+00
## 30	glgX	8.6813e-05	1.1281e-04	6.1701e-05	0.0000e+00	1.7965e-04
## 31	Rv3161c	1.1743e-03	1.2509e-03	1.1646e-03	1.1755e-03	8.8158e-04
## 32	accD2	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
## 33	fadE8	3.8495e-05	3.7516e-05	0.0000e+00	0.0000e+00	1.9118e-04
## 34	mtr	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00	0.0000e+00
## 35	glbX	1.2348e-03	1.2034e-03	1.6115e-03	1.2496e-03	5.2867e-04
## 36	fadE22	2.1703e-04	3.5253e-04	2.3138e-04	3.1139e-04	0.0000e+00
## 37	icd2	2.8286e-03	2.8931e-03	3.0305e-03	3.8081e-03	4.2769e-03
## 38	htdY	1.5828e-03	1.2270e-03	8.4371e-04	2.8152e-04	1.7865e-04
## 39	mihF	5.2709e-03	4.3343e-03	1.8146e-03	1.8262e-03	1.7724e-03
## 40	rpsQ	3.8637e-04	4.5186e-04	1.5653e-03	1.2095e-03	1.1513e-03
## 41	prnA	1.9252e-03	6.5452e-04	1.4320e-03	1.9272e-03	7.7826e-04
## 42	hlyY	1.3817e-04	1.0100e-04	1.5344e-03	9.6871e-04	8.2918e-04
## 43	glbD	9.8335e-04	7.9169e-04	1.0028e-03	4.1825e-04	1.0617e-04
## 44	hemB	1.5537e-03	1.5142e-03	1.6226e-03	2.6676e-03	2.2047e-03
## 45	fadE7	2.0336e-03	1.5701e-03	3.8855e-03	3.6687e-03	1.7707e-03
## 46	mtrA	1.6929e-03	1.3823e-03	1.3170e-03	1.0742e-03	0.0000e+00
## 47	glgP	2.7803e-03	2.8392e-03	2.5388e-03	2.0576e-03	1.7410e-03
## 48	serA	1.4621e-03	9.8203e-04	1.6430e-03	2.2421e-03	1.4228e-03
## 49	apa	4.6543e-03	5.6622e-03	4.0038e-03	4.1449e-03	6.1375e-03
## 50	fadA2	1.1143e-03	3.9281e-04	9.3523e-04	4.1749e-04	2.3550e-04
## 51	proS	2.7066e-03	2.8649e-03	2.5033e-03	2.5601e-03	2.4481e-03
## 52	lsr2	1.3040e-03	1.1801e-03	7.9440e-04	7.2894e-04	0.0000e+00
## 53	rp1F	2.8557e-03	2.7831e-03	3.6658e-03	4.9031e-03	2.7497e-03
## 54	groEL1	7.1611e-04	4.5270e-04	4.1268e-04	1.1360e-04	9.6122e-05
## 55	trkA	1.6596e-03	1.9410e-03	2.3254e-03	2.9688e-03	1.6485e-03
## 56	sapM	1.1165e-03	1.3261e-03	1.0415e-03	0.0000e+00	6.9311e-04
## 57	echA5	3.9666e-04	3.4792e-04	4.2288e-04	6.9846e-04	0.0000e+00
## 58	Rv0794c	3.9721e-04	4.2787e-04	2.8974e-04	4.0903e-04	1.5574e-04
## 59	mku	0.0000e+00	0.0000e+00	6.1108e-04	6.7287e-04	5.6934e-04

```

## 60      leuB 4.6572e-04 1.5129e-04 6.6200e-04 4.2522e-04 2.3129e-04
## 61 Rv2030c 2.3438e-03 2.1648e-03 3.1030e-03 2.9072e-03 2.5867e-03
## 62      ureC 5.9663e-04 4.5813e-04 5.5897e-04 4.5985e-04 2.2448e-04
## 63      glnA1 2.0013e-02 1.8632e-02 1.8916e-02 2.1820e-02 3.3763e-02
## 64      rpsC 3.8073e-04 0.0000e+00 1.2583e-03 2.3837e-03 3.7817e-04
## 65      rp1M 1.6322e-03 2.4207e-03 2.1941e-03 2.0827e-03 1.9385e-03
## 66      katG 1.0263e-02 1.1348e-02 1.1467e-02 1.1198e-02 1.5123e-02
## 67      frn 2.7631e-03 3.1325e-03 1.0821e-03 1.4342e-03 2.8005e-03
## 68      pstS1 5.4113e-03 5.2466e-03 5.5608e-03 1.0533e-02 6.5108e-03
## 69      PPE41 6.9905e-04 7.3369e-04 7.4527e-04 1.3677e-03 9.3471e-04
## 70      ileS 4.8102e-04 5.3716e-04 1.8162e-04 1.1764e-04 9.9538e-05
## 71      csm6 9.8036e-04 1.1269e-03 8.5757e-04 2.9509e-04 0.0000e+00
## 72 Rv1906c 1.0700e-03 1.2383e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 73      Rv1404 2.2820e-03 2.2876e-03 1.8073e-03 1.4032e-03 1.9429e-03
## 74      proA 3.9466e-03 2.7193e-03 4.7167e-03 5.7543e-03 5.4931e-03
## 75      gabT 7.8995e-04 9.9631e-04 1.1642e-03 9.0915e-04 6.3464e-04
## 76      hsaC 9.7366e-04 1.1861e-03 9.6388e-04 1.0886e-03 8.6349e-04
## 77      espG5 2.0864e-04 0.0000e+00 8.8973e-04 6.8035e-04 0.0000e+00
## 78      gltA2 1.2465e-02 1.2927e-02 1.3883e-02 1.7380e-02 1.9293e-02
## 79      groEL2 5.5831e-03 3.5772e-03 2.4303e-03 2.5324e-03 2.8303e-03
## 80      clpP1 2.1907e-03 2.0842e-03 3.2809e-03 3.6739e-03 2.2019e-03
## 81      d1aT 3.2447e-03 2.9968e-03 2.3128e-03 3.0265e-03 2.2954e-03
## 82      cysK1 2.1201e-03 2.0006e-03 1.1480e-03 1.3168e-03 7.5208e-04
## 83      rp1S 1.2001e-03 8.0975e-04 1.2795e-03 7.2249e-04 0.0000e+00
## 84      dhmA1 0.0000e+00 0.0000e+00 7.7852e-04 1.1566e-03 6.9080e-04
## 85      trmI 2.4590e-03 2.3602e-03 2.5818e-03 3.0616e-03 3.3306e-03
## 86      ahpC 6.9547e-04 1.1992e-03 2.2814e-04 0.0000e+00 5.3138e-04
## 87      echA6 5.5809e-04 6.2759e-04 1.6477e-03 5.8796e-04 0.0000e+00
## 88      chdC 2.5741e-03 2.5967e-03 2.9850e-03 4.4178e-03 4.0371e-03
## 89      desA2 1.6312e-03 1.3679e-03 1.6581e-03 1.0391e-03 5.6520e-04
## 90      treS 1.2671e-03 1.2349e-03 1.1843e-03 2.7169e-04 4.3103e-04
## 91      coaBC 2.2461e-04 0.0000e+00 1.4900e-03 1.2207e-03 0.0000e+00
## 92      ilvX 4.4564e-04 2.3690e-04 4.9670e-04 4.3595e-04 0.0000e+00
## 93 Rv1703c 9.0482e-04 3.1123e-04 5.1069e-04 2.0827e-04 0.0000e+00
## 94      tsf 5.1583e-03 5.0647e-03 2.4213e-03 1.8829e-03 1.2427e-03
## 95      Rv2212 1.3523e-03 1.5869e-03 2.4715e-03 3.0778e-03 4.7972e-04
## 96      sucC 7.5477e-04 5.2542e-04 9.7710e-04 8.4384e-04 4.0163e-04
## 97      tkt 3.5320e-03 3.6456e-03 2.6374e-03 2.9158e-03 2.2204e-03
## 98      fadE35 4.0462e-04 5.1435e-04 3.0008e-04 4.8187e-04 6.1158e-04
## 99      fbpA 6.8827e-03 6.3769e-03 5.1002e-03 4.6497e-03 1.0040e-02
## 100      pks13 1.9865e-04 1.9360e-04 2.3103e-04 0.0000e+00 0.0000e+00
## 101      echA4 7.3559e-04 1.2057e-03 8.5551e-04 1.3084e-03 6.6423e-04
## 102      ilvG 2.2886e-04 1.8587e-04 1.8299e-04 0.0000e+00 0.0000e+00
## 103 Rv3552 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 104 Rv3127 6.0651e-04 5.6154e-04 1.1962e-03 1.1273e-03 0.0000e+00
## 105      metG 1.4673e-03 1.7043e-03 2.0143e-03 2.5169e-03 1.3477e-03
## 106      trpE 1.6174e-04 1.3792e-04 1.0777e-04 0.0000e+00 0.0000e+00
## 107      aroA 1.5532e-03 1.1974e-03 1.3099e-03 9.9784e-04 0.0000e+00
## 108      atpD 0.0000e+00 0.0000e+00 6.8652e-05 2.9398e-04 5.3302e-04
## 109      ino1 5.6850e-04 4.7095e-04 6.0609e-04 6.1176e-04 0.0000e+00
## 110      valS 1.6013e-03 1.6180e-03 1.1548e-03 6.6806e-04 3.8009e-04
## 111 Rv3463 6.5887e-04 4.6375e-04 4.2926e-04 0.0000e+00 0.0000e+00
## 112      fbpB 6.8691e-03 8.0397e-03 3.8327e-03 4.2705e-03 8.6084e-03
## 113      kasA 9.5293e-04 7.3319e-04 5.8817e-04 0.0000e+00 2.4908e-04
## 114 Rv1488 0.0000e+00 0.0000e+00 2.3353e-04 6.9642e-04 2.0398e-04
## 115      scoA 1.2199e-03 8.1991e-04 1.3005e-03 1.3991e-03 1.4624e-03
## 116      cysA1 1.6947e-03 1.5783e-03 6.4241e-04 2.9474e-04 0.0000e+00
## 117 Rv1683 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 118 Rv1324 1.9217e-03 2.1738e-03 1.2439e-03 0.0000e+00 0.0000e+00
## 119      inhA 0.0000e+00 0.0000e+00 7.0286e-04 6.8288e-04 0.0000e+00
## 120      argS 1.5933e-03 1.5528e-03 5.4597e-04 1.8555e-04 0.0000e+00
## 121      fadE31 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 122      ahcY 9.2519e-03 9.2837e-03 5.2800e-03 6.3499e-03 8.2686e-03
## 123      ahpD 3.3005e-03 4.1931e-03 8.7968e-03 5.9963e-03 8.4886e-03
## 124      ftsY 0.0000e+00 0.0000e+00 1.0542e-04 1.9346e-04 1.2277e-04
## 125      mmaA2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 126 Rv3205c 2.5008e-04 2.7855e-04 4.5705e-04 0.0000e+00 0.0000e+00
## 127      serC 3.1907e-03 3.1907e-03 2.2776e-03 1.7371e-03 1.9980e-03
## 128 Rv2067c 1.4610e-03 1.2490e-03 1.5303e-03 1.5045e-03 1.9094e-04

```

```

## 129 Rv3673c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 130 trpB 1.1619e-03 9.8778e-04 1.2650e-03 1.1608e-03 2.4554e-04
## 131 leuS 2.1639e-03 1.9935e-03 2.1578e-03 1.8536e-03 1.7911e-03
## 132 Rv0272c 7.7479e-04 6.7420e-04 1.0620e-03 6.4967e-04 6.1842e-04
## 133 Rv0144 2.9806e-04 0.0000e+00 3.1776e-04 1.4579e-04 0.0000e+00
## 134 pup 6.0310e-03 5.2423e-03 6.7773e-03 6.3783e-03 1.6191e-03
## 135 lpdA 1.0580e-04 0.0000e+00 1.3535e-04 2.4840e-04 1.0509e-04
## 136 Rv0238 3.0682e-04 3.4886e-04 5.9970e-04 0.0000e+00 0.0000e+00
## 137 Rv1463 5.8827e-04 2.6755e-04 5.8535e-04 0.0000e+00 0.0000e+00
## 138 fadB2 1.8238e-03 1.5997e-03 2.5277e-03 1.7841e-03 9.0576e-04
## 139 ilvC 1.5787e-03 1.4783e-03 2.7062e-03 2.5437e-03 2.0755e-03
## 140 aceE 3.5447e-03 3.8153e-03 3.3126e-03 3.6870e-03 3.1476e-03
## 141 rplX 7.9482e-04 8.7145e-04 7.4144e-04 3.8877e-04 0.0000e+00
## 142 devR 4.3267e-04 2.8111e-04 0.0000e+00 1.8811e-04 0.0000e+00
## 143 mpt83 6.6386e-04 6.0077e-04 1.4155e-03 2.2266e-03 1.1775e-03
## 144 Rv0063 1.0889e-03 1.1249e-03 4.4115e-04 0.0000e+00 4.3265e-04
## 145 bkdB 2.6979e-04 3.5058e-04 6.0722e-04 0.0000e+00 0.0000e+00
## 146 Rv0925c 2.1716e-03 2.3239e-03 1.4980e-03 1.4995e-03 1.3745e-03
## 147 purB 2.2102e-04 8.6160e-05 4.2413e-04 0.0000e+00 0.0000e+00
## 148 kshA 6.2160e-04 5.2678e-04 4.6100e-04 4.7589e-04 0.0000e+00
## 149 Rv1558 1.1983e-03 1.0991e-03 4.5088e-04 0.0000e+00 0.0000e+00
## 150 ctpV 0.0000e+00 0.0000e+00 2.5999e-04 6.8918e-04 0.0000e+00
## 151 Rv2696c 4.8334e-04 5.8882e-04 2.1470e-04 0.0000e+00 0.0000e+00
## 152 fadB 9.7076e-04 8.3312e-04 7.4144e-04 3.4017e-04 0.0000e+00
## 153 Rv0898c 1.4389e-03 2.1035e-03 7.6701e-04 0.0000e+00 0.0000e+00
## 154 Rv2675c 5.8419e-04 4.8801e-04 4.8935e-04 0.0000e+00 0.0000e+00
## 155 rnj 2.2435e-04 2.3686e-04 1.3952e-04 0.0000e+00 2.3212e-04
## 156 rpmB2 0.0000e+00 1.8248e-03 4.4202e-03 2.6167e-03 3.9854e-03
## 157 rpsG 1.4043e-03 9.1241e-04 2.5665e-03 0.0000e+00 0.0000e+00
## 158 adoK 5.7956e-04 4.7069e-04 6.8652e-04 9.4493e-04 0.0000e+00
## 159 pgmA 3.8143e-04 3.5315e-04 6.9129e-04 5.9701e-04 1.8943e-04
## 160 fadE26 5.2160e-05 0.0000e+00 1.9463e-04 0.0000e+00 0.0000e+00
## 161 Rv2466c 0.0000e+00 0.0000e+00 6.4473e-04 8.8741e-04 5.0058e-04
## 162 metH 2.3630e-04 2.4735e-04 9.3303e-05 3.4246e-05 0.0000e+00
## 163 bkdC 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 164 pdtAr 1.2722e-03 1.6366e-03 4.3402e-04 0.0000e+00 0.0000e+00
## 165 blaC 1.1893e-03 1.1922e-03 2.8982e-04 3.9890e-04 6.7504e-04
## 166 metE 5.7727e-04 6.8315e-04 5.8612e-04 2.6891e-04 0.0000e+00
## 167 Rv3368c 1.8524e-03 1.9479e-03 1.2473e-03 1.1445e-03 1.3316e-03
## 168 purH 1.1968e-03 1.1469e-03 7.2301e-04 4.6831e-04 1.4859e-04
## 169 Rv2603c 0.0000e+00 5.2657e-04 1.0191e-03 2.1142e-03 1.6513e-03
## 170 echA16 4.3572e-03 4.3281e-03 4.1092e-03 4.2624e-03 2.9130e-03
## 171 pstS2 2.7913e-03 2.6104e-03 2.0139e-03 3.8614e-03 2.9405e-03
## 172 pgk 0.0000e+00 0.0000e+00 1.0798e-04 0.0000e+00 0.0000e+00
## 173 Rv0566c 1.7280e-03 1.4346e-03 4.0939e-04 0.0000e+00 0.0000e+00
## 174 nadE 8.2965e-04 7.1872e-04 1.0974e-03 1.0521e-03 3.4336e-04
## 175 gap 1.8772e-03 1.0197e-03 3.3463e-03 4.4554e-03 3.5915e-03
## 176 moaC2 3.7480e-04 0.0000e+00 1.3985e-03 7.3331e-04 0.0000e+00
## 177 Rv1627c 0.0000e+00 0.0000e+00 4.1499e-04 0.0000e+00 0.0000e+00
## 178 apeB 2.1683e-04 2.1132e-04 4.6233e-04 4.2424e-04 0.0000e+00
## 179 Rv0731c 2.0667e-03 2.2380e-03 0.0000e+00 0.0000e+00 5.7023e-04
## 180 pdxH 2.6546e-03 2.9956e-03 6.4545e-04 0.0000e+00 1.0408e-03
## 181 TB18 1.4255e-03 1.7682e-03 6.2171e-04 0.0000e+00 0.0000e+00
## 182 metZ 3.1861e-03 3.0801e-03 3.3694e-03 4.3737e-03 4.5302e-03
## 183 eno 1.2402e-03 7.1097e-04 1.3481e-03 1.5700e-03 4.8307e-04
## 184 Rv1429 7.4161e-05 0.0000e+00 3.6897e-04 4.8366e-04 0.0000e+00
## 185 gdh 2.5695e-05 2.5042e-05 1.9860e-04 7.5408e-05 0.0000e+00
## 186 gcvP 7.2060e-04 7.1309e-04 5.2004e-04 3.0366e-04 1.6517e-04
## 187 Rv3520c 1.2025e-04 2.0510e-04 4.8076e-04 0.0000e+00 0.0000e+00
## 188 ggtA 6.1125e-04 6.3543e-04 5.2133e-04 3.1891e-04 0.0000e+00
## 189 fusA 1.4882e-04 8.7021e-05 3.8077e-04 2.0381e-04 0.0000e+00
## 190 Rv0571c 3.7678e-04 2.0655e-04 8.7869e-04 0.0000e+00 0.0000e+00
## 191 murE 9.7496e-05 0.0000e+00 5.6128e-04 3.0520e-04 0.0000e+00
## 192 icl 3.2905e-03 3.6344e-03 2.5466e-03 2.8613e-03 3.8131e-03
## 193 echA9 1.0583e-03 1.3556e-03 1.9342e-04 0.0000e+00 5.2561e-04
## 194 mmsA 5.1137e-03 5.0037e-03 5.3210e-03 5.5228e-03 6.5524e-03
## 195 birA 0.0000e+00 1.1466e-04 6.2716e-04 3.0692e-04 0.0000e+00
## 196 guaA 1.2717e-03 9.4891e-04 1.5041e-03 1.3218e-03 1.0362e-03
## 197 Rv1288 1.0066e-03 6.0199e-04 9.7558e-04 7.1616e-04 4.5447e-04

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## 198      prfB 1.1529e-03 7.1251e-04 3.2975e-04 0.0000e+00 2.7930e-04
## 199      Rv2623 3.1612e-04 2.3962e-04 8.2383e-04 2.7489e-04 0.0000e+00
## 200      Rv2204c 1.7681e-03 2.7571e-03 2.0735e-03 2.9405e-03 1.5367e-03
## 201      dapD 1.4480e-03 9.6217e-04 2.4208e-03 3.5412e-03 2.5333e-03
## 202      Rv3747 2.7928e-03 3.2022e-03 0.0000e+00 0.0000e+00 2.0398e-03
## 203      Rv0075 4.8148e-04 4.4317e-04 2.2814e-04 0.0000e+00 0.0000e+00
## 204      dnaN 2.8545e-03 2.5038e-03 3.5966e-03 5.1280e-03 4.3819e-03
## 205      echA17 5.7499e-04 6.0041e-04 5.2543e-04 6.4285e-04 3.0596e-04
## 206      echA1 2.4687e-03 2.0179e-03 1.8678e-03 1.1685e-03 9.8873e-04
## 207      Rv3282 7.5186e-04 6.8695e-04 5.0098e-04 0.0000e+00 0.0000e+00
## 208      fadA4 6.6776e-03 6.4817e-03 4.6888e-03 4.6697e-03 7.1921e-03
## 209      Rv1100 0.0000e+00 0.0000e+00 3.8186e-04 9.6358e-04 8.8944e-04
## 210      groS 1.0849e-01 1.1946e-01 5.6943e-02 2.0206e-02 4.3002e-02
## 211      rpsF 0.0000e+00 0.0000e+00 9.2681e-04 1.9135e-03 0.0000e+00
## 212      Rv1815 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 213      Rv0248c 1.4695e-03 1.3692e-03 8.7803e-04 8.5307e-04 2.4060e-04
## 214      lpqZ 1.0943e-04 0.0000e+00 1.9443e-04 5.7092e-04 0.0000e+00
## 215      btoA 2.1485e-04 2.3265e-04 1.5270e-04 0.0000e+00 1.1856e-04
## 216      glpK 1.3923e-03 1.1013e-03 1.8285e-03 1.2238e-03 1.5032e-04
## 217      gpmA 3.3936e-03 2.5723e-03 1.6973e-03 1.0656e-03 5.2018e-04
## 218      Rv0158 3.4124e-04 3.3256e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 219      Rv3472 5.5886e-04 5.4466e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 220      Rv1159 1.4427e-03 1.4061e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 221      vapC32 6.7304e-04 6.5593e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 222      Rv1566c 6.8035e-04 7.0726e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 223     ftsE 0.0000e+00 0.0000e+00 0.0000e+00 3.5496e-04 3.3789e-04
## 224      ilvA 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 225      rpsA 2.6026e-04 2.7478e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 226      lpjJ 0.0000e+00 0.0000e+00 2.9737e-04 3.2744e-04 0.0000e+00
## 227      Rv1855c 1.3592e-04 9.9351e-05 4.7095e-04 0.0000e+00 0.0000e+00
## 228      Rv2951c 0.0000e+00 0.0000e+00 1.1384e-03 4.2857e-04 0.0000e+00
## 229      mazF9 9.7248e-04 8.6160e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 230      sigK 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 231      suhB 0.0000e+00 0.0000e+00 2.6845e-04 2.1114e-04 0.0000e+00
## 232      mmsB 3.5483e-04 2.7665e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 233      lpqM 6.2844e-05 8.1662e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 234      orn 4.3669e-04 3.3102e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 235      Rv2672 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 236      Rv1056 2.1768e-03 2.3216e-03 2.8023e-03 2.9732e-03 9.1789e-04
## 237      vapC2 5.9189e-04 7.9316e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 238      fhaA 5.1467e-04 1.7363e-04 1.4773e-04 0.0000e+00 0.0000e+00
## 239      TB16 1.5213e-03 2.0475e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 240      Rv0443 3.0503e-04 4.1619e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 241      Rv0854 3.5483e-04 4.8414e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 242      dapA 3.1296e-03 2.9823e-03 2.0019e-03 1.7009e-03 7.7715e-04
## 243      prpD 1.1900e-04 0.0000e+00 8.4575e-05 0.0000e+00 0.0000e+00
## 244      Rv1276c 5.9423e-04 8.3652e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 245      Rv2117 6.4528e-04 0.0000e+00 9.1725e-04 0.0000e+00 0.0000e+00
## 246      csd 0.0000e+00 0.0000e+00 5.6008e-04 3.9157e-04 0.0000e+00
## 247      rp1E 2.9009e-03 2.1747e-03 2.7358e-03 3.6018e-03 4.7100e-03
## 248      Rv2134c 5.8847e-04 8.8635e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 249      Rv3207c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 250      cdh 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 251      nusG 1.3150e-04 8.5436e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 252      Rv1084 1.3951e-04 9.0641e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 253      Rv3716c 1.9609e-03 3.0577e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 254      Rv3193c 0.0000e+00 0.0000e+00 0.0000e+00 3.4978e-04 0.0000e+00
## 255      Rv1333 0.0000e+00 0.0000e+00 3.8797e-04 3.5600e-04 3.7652e-04
## 256      Rv3542c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 257      Rv1944c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 258      eccB3 5.8171e-05 9.4488e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 259      bcp 1.9934e-04 3.2379e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 260      rpsM 0.0000e+00 0.0000e+00 8.0722e-04 1.3168e-03 0.0000e+00
## 261      ppgK 0.0000e+00 0.0000e+00 3.7772e-04 6.1616e-04 0.0000e+00
## 262      Rv3835 3.0204e-04 1.8115e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 263      dacB2 1.0755e-03 1.2228e-03 2.6753e-04 0.0000e+00 0.0000e+00
## 264      tal 3.8316e-03 3.7342e-03 1.5803e-03 2.5718e-03 3.2641e-03
## 265      lysA 7.9349e-04 7.5058e-04 2.2393e-04 0.0000e+00 0.0000e+00
## 266      bfrB 8.4724e-03 9.4929e-03 8.1108e-03 1.2404e-02 1.3167e-02

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## 267      Rv1155 2.8387e-04 4.8414e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 268      Rv2915c 1.4097e-04 8.2434e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 269      ald 2.1623e-02 2.0224e-02 1.5079e-02 2.5967e-02 3.4773e-02
## 270      fba 1.8650e-02 1.7969e-02 1.5907e-02 1.7266e-02 2.5980e-02
## 271      accD4 0.0000e+00 0.0000e+00 0.0000e+00 1.1730e-04 0.0000e+00
## 272      rps0 0.0000e+00 0.0000e+00 2.2493e-03 2.9813e-03 5.2392e-03
## 273      hspX 2.9702e-03 3.8832e-03 2.4715e-03 3.1183e-03 4.3175e-03
## 274      Rv3730c 2.1105e-04 1.1754e-04 7.7145e-04 0.0000e+00 0.0000e+00
## 275      Rv3079c 1.9347e-03 1.2570e-03 9.7062e-04 0.0000e+00 4.7100e-04
## 276      hsaD 3.2264e-03 3.3890e-03 3.1339e-03 4.5590e-03 2.4035e-03
## 277      Rv2054 0.0000e+00 0.0000e+00 7.9776e-04 4.3060e-04 0.0000e+00
## 278      Rv3618 3.9615e-04 2.0591e-04 1.4078e-04 1.0334e-04 0.0000e+00
## 279      coaD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 280      thiC 2.6700e-04 2.7880e-04 3.0498e-04 0.0000e+00 0.0000e+00
## 281      eccB1 4.1294e-04 2.1181e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 282      Rv3169 5.0208e-03 4.9747e-03 4.4606e-03 5.2390e-03 5.5411e-03
## 283      ilvE 1.7009e-03 1.5471e-03 1.2693e-03 4.9917e-04 0.0000e+00
## 284      tyrS 7.1351e-04 6.4742e-04 1.1541e-03 1.1553e-03 4.8877e-04
## 285      Rv2971 1.1468e-03 1.0095e-03 4.3382e-04 0.0000e+00 7.3489e-04
## 286      TB9 3.4773e-04 5.6483e-04 6.1787e-04 0.0000e+00 0.0000e+00
## 287      Rv3920c 8.9258e-04 4.3495e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 288      fbpC 3.4058e-03 3.0800e-03 2.6169e-03 2.5213e-03 1.7524e-03
## 289      grcC1 0.0000e+00 0.0000e+00 1.3944e-03 6.7019e-04 0.0000e+00
## 290      rp1P 1.5875e-03 9.5775e-04 4.1102e-03 5.3245e-03 3.9420e-03
## 291      Rv2345 3.3193e-04 2.7728e-04 3.2017e-04 0.0000e+00 0.0000e+00
## 292      Rv2721c 2.6864e-04 1.5999e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 293      lpp0 6.7107e-04 7.7292e-04 9.7558e-04 1.5517e-03 2.2724e-03
## 294      ltp1 3.9023e-04 3.0425e-04 1.3867e-04 0.0000e+00 0.0000e+00
## 295      Rv2402 6.1365e-05 0.0000e+00 1.3084e-04 0.0000e+00 0.0000e+00
## 296      Rv3699 1.4775e-03 2.0945e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 297      Rv1377c 2.4604e-04 5.2753e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 298      echA19 5.1565e-04 5.7986e-04 4.2288e-04 0.0000e+00 0.0000e+00
## 299      proC 3.3948e-03 3.2741e-03 5.2781e-03 7.4723e-03 6.4103e-03
## 300      cut6 0.0000e+00 0.0000e+00 2.3170e-04 6.0745e-04 0.0000e+00
## 301      sir 2.4247e-03 2.6929e-03 2.1241e-03 1.8020e-03 2.1004e-03
## 302      pepN 2.1809e-03 2.1963e-03 1.4596e-03 1.1142e-03 2.0158e-03
## 303      Rv0518 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 304      Rv3671c 8.1459e-04 4.3536e-04 1.8770e-03 2.7248e-03 1.5660e-03
## 305      tesB2 1.0395e-03 9.0453e-04 9.1031e-04 4.3581e-04 1.8438e-04
## 306      Rv0831c 5.5432e-03 4.9521e-03 4.7606e-03 5.7993e-03 3.2501e-03
## 307      acn 6.5823e-03 6.9001e-03 6.0267e-03 6.3634e-03 7.4995e-03
## 308      Rv2314c 3.1958e-04 2.6696e-04 3.6504e-04 0.0000e+00 0.0000e+00
## 309      nadC 1.4641e-03 1.0702e-03 2.5755e-03 3.2943e-03 2.4541e-03
## 310      mtcA1 2.3680e-03 2.2455e-03 1.6375e-03 1.6278e-03 3.1785e-03
## 311      accA1 2.3927e-04 1.3991e-04 5.6119e-04 1.8725e-04 0.0000e+00
## 312      Rv3684 0.0000e+00 0.0000e+00 2.8929e-04 1.1798e-04 0.0000e+00
## 313      hemC 3.7137e-04 4.2773e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 314      Rv0576 1.2018e-04 4.6852e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 315      menD 5.6491e-05 0.0000e+00 3.4128e-04 3.3158e-04 0.0000e+00
## 316      aroQ 4.9676e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 317      Rv0333 1.3461e-03 1.9678e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 318      hsaE 2.7979e-04 3.5058e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 319      Rv0479c 0.0000e+00 0.0000e+00 2.2371e-04 5.8651e-04 0.0000e+00
## 320      hisC 1.0981e-04 0.0000e+00 2.9268e-04 0.0000e+00 0.0000e+00
## 321      sodC 1.8691e-03 1.4827e-03 1.8536e-03 4.0821e-03 3.8857e-03
## 322      citE 2.3310e-03 2.6069e-03 1.4666e-03 2.2429e-03 2.3722e-03
## 323      pks12 0.0000e+00 0.0000e+00 5.3585e-06 0.0000e+00 0.0000e+00
## 324      atsA 1.3255e-04 1.5502e-04 8.4790e-05 0.0000e+00 0.0000e+00
## 325      rp1L 2.6481e-03 2.9719e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 326      glcB 6.1663e-03 6.7093e-03 5.0130e-03 3.3329e-03 6.7821e-03
## 327      Rv0913c 6.6499e-04 1.0937e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 328      sseA 8.4299e-04 5.4771e-04 1.1234e-04 0.0000e+00 0.0000e+00
## 329      mas 5.9301e-05 4.3345e-05 1.4225e-04 9.6686e-05 0.0000e+00
## 330      Rv2536 0.0000e+00 0.0000e+00 0.0000e+00 5.3245e-04 6.7578e-04
## 331      kdc 0.0000e+00 1.6340e-04 3.1776e-04 1.4579e-04 0.0000e+00
## 332      Rv3591c 3.6532e-04 5.5384e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 333      lldD 0.0000e+00 0.0000e+00 1.6387e-03 1.7255e-03 3.7543e-04
## 334      rpmC 1.2193e-03 1.9806e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 335      Rv3796 1.0571e-03 8.1335e-04 8.3042e-04 4.8985e-04 0.0000e+00

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## 336      sdhA 1.5913e-04 5.1696e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 337      dapC 6.5693e-04 5.8901e-04 4.2021e-04 3.5988e-04 1.3050e-04
## 338      Rv3304 2.6244e-04 8.3126e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 339      php 7.0400e-04 7.1730e-04 6.8231e-05 0.0000e+00 0.0000e+00
## 340      Rv1919c 0.0000e+00 0.0000e+00 7.2219e-04 9.2775e-04 0.0000e+00
## 341      serB2 7.6519e-04 6.2145e-04 1.0605e-03 7.4855e-04 2.5335e-04
## 342      rp1C 2.4037e-04 0.0000e+00 2.3576e-03 2.8217e-03 7.1626e-04
## 343      Rv2006 2.3584e-04 1.9154e-04 5.8667e-04 4.3066e-04 5.8564e-05
## 344      dut 1.2871e-03 1.1223e-03 5.7775e-04 0.0000e+00 0.0000e+00
## 345      Rv1257c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 346      Rv0265c 9.1676e-04 1.1399e-03 1.5503e-03 1.7318e-03 1.4915e-03
## 347      metC 1.9517e-03 1.4265e-03 2.7495e-03 3.2275e-03 2.7116e-03
## 348      Rv2585c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 349      argB 8.1611e-04 1.0374e-04 2.2697e-03 1.3190e-03 0.0000e+00
## 350      rpoA 6.9146e-04 0.0000e+00 1.9231e-04 0.0000e+00 0.0000e+00
## 351      lpqT 0.0000e+00 0.0000e+00 6.3974e-04 7.2249e-04 0.0000e+00
## 352      ltp2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 353      Rv1885c 8.9118e-04 1.3794e-03 1.1178e-04 0.0000e+00 0.0000e+00
## 354      rp1T 2.8304e-03 3.1525e-03 7.3282e-03 7.4364e-03 9.2374e-03
## 355      moaB2 6.3399e-04 1.6851e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 356      rocA 1.1719e-03 7.4894e-04 1.8639e-03 2.1049e-03 5.2478e-04
## 357      Rv0250c 1.8283e-03 1.9915e-03 1.7198e-03 0.0000e+00 0.0000e+00
## 358      rpmD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 359      Rv1922 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 360      trpS 4.3467e-04 3.3285e-04 3.6410e-04 5.4671e-04 0.0000e+00
## 361      accD5 3.1601e-03 3.7662e-03 3.0240e-03 3.7245e-03 3.9708e-03
## 362      qor 2.7034e-03 2.1698e-03 1.7632e-03 1.3068e-03 1.1847e-03
## 363      metK 4.1418e-04 1.5137e-04 1.1315e-03 3.0388e-04 0.0000e+00
## 364      pdxS 6.9780e-05 0.0000e+00 1.0787e-03 2.7305e-04 0.0000e+00
## 365      Rv2680 5.4644e-04 9.6828e-04 5.2960e-04 0.0000e+00 0.0000e+00
## 366      purT 0.0000e+00 0.0000e+00 7.9630e-05 3.4099e-04 0.0000e+00
## 367      Rv3559c 3.1854e-04 1.9402e-04 2.9714e-04 0.0000e+00 0.0000e+00
## 368      mmcO 1.6559e-04 1.4121e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 369      pnp 1.9976e-03 2.0550e-03 1.8191e-03 2.3070e-03 1.5502e-03
## 370      pheA 1.8199e-03 1.6153e-03 1.2473e-03 2.0347e-03 8.0700e-04
## 371      echA7 2.3269e-04 3.0236e-04 8.2689e-05 0.0000e+00 0.0000e+00
## 372      ispE 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 373      fadE2 5.1772e-04 4.2888e-04 1.1039e-03 8.1034e-04 0.0000e+00
## 374      purE 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 375      lprA 3.5486e-03 3.7084e-03 4.6036e-03 8.4486e-03 7.2194e-03
## 376      prs 3.0720e-03 2.5261e-03 4.7079e-03 4.5704e-03 2.0660e-03
## 377      proX 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 378      Rv2148c 2.8304e-04 2.3644e-04 1.0346e-03 8.7021e-04 0.0000e+00
## 379      Rv0216 1.5168e-03 1.1464e-03 1.2541e-03 8.4791e-04 1.0762e-03
## 380      Rv0907 1.7648e-04 2.4844e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 381      Rv0308 0.0000e+00 0.0000e+00 0.0000e+00 1.3721e-03 1.3061e-03
## 382      pks11 1.1821e-04 0.0000e+00 6.3012e-04 0.0000e+00 0.0000e+00
## 383      espB 1.8369e-03 1.8345e-03 1.2572e-03 1.1093e-03 8.4472e-04
## 384      mpt51 2.9307e-03 3.8763e-03 7.0673e-04 0.0000e+00 1.9927e-03
## 385      Rv0148 8.7542e-04 1.1731e-03 8.1663e-04 4.9956e-04 2.7173e-04
## 386      Rv1006 1.6007e-03 1.2193e-03 1.8634e-03 2.3758e-03 2.0103e-03
## 387      Rv2251 1.8887e-03 2.0976e-03 1.9200e-03 2.0625e-03 2.1269e-03
## 388      thrC 1.1591e-03 7.3428e-04 2.0081e-03 1.9843e-03 5.7566e-04
## 389      Rv3587c 2.6080e-03 2.2721e-03 1.4323e-03 1.4689e-03 2.6494e-03
## 390      lpqB 1.2973e-03 1.6108e-03 9.6628e-04 1.1127e-03 1.0591e-03
## 391      rm1C 0.0000e+00 4.0265e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 392      TB22 3.3548e-03 3.9861e-03 9.7988e-04 1.1689e-03 0.0000e+00
## 393      mtp 2.0256e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 394      Rv3033 0.0000e+00 0.0000e+00 4.8886e-04 6.7287e-04 0.0000e+00
## 395      Rv2714 1.1913e-03 1.1610e-03 7.5518e-04 8.1894e-04 6.3963e-04
## 396      scoB 1.2920e-03 1.2592e-03 1.6325e-03 6.5538e-04 8.3181e-04
## 397      fadE25 1.0727e-04 0.0000e+00 3.4308e-04 0.0000e+00 0.0000e+00
## 398      mcr 1.4489e-04 2.5417e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 399      dnaK 2.2300e-02 2.7345e-02 2.3916e-02 2.4754e-02 3.4070e-02
## 400      Rv1910c 6.2281e-04 5.5640e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 401      nnr 0.0000e+00 0.0000e+00 3.0567e-04 0.0000e+00 0.0000e+00
## 402      acpM 9.5249e-03 8.3987e-03 5.0289e-03 5.8569e-03 8.7851e-03
## 403      hemL 7.6773e-04 6.3818e-04 2.0462e-03 2.2973e-03 0.0000e+00
## 404      argD 5.7376e-04 5.0835e-04 7.2291e-04 0.0000e+00 0.0000e+00

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## 405 Rv1280c 6.0015e-04 6.5371e-04 5.6455e-04 3.7989e-04 5.6982e-04
## 406 Rv2744c 3.2455e-03 9.0373e-04 1.3799e-02 2.0335e-02 1.5159e-02
## 407 cut7 6.2496e-04 6.5593e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 408 ponA2 1.2879e-04 1.2552e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 409 fadE12 0.0000e+00 0.0000e+00 1.1466e-04 0.0000e+00 0.0000e+00
## 410 subI 1.0549e-03 1.0567e-03 3.4365e-04 5.7333e-04 0.0000e+00
## 411 pckG 3.8389e-03 4.3620e-03 1.4499e-03 1.2799e-03 3.2488e-03
## 412 Rv2548A 2.5239e-04 1.3939e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 413 pgI 5.4906e-04 5.7626e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 414 ppiA 1.1464e-03 1.0055e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 415 pyk 1.2377e-03 8.6160e-04 2.5448e-03 2.5081e-03 5.4883e-04
## 416 gcvT 2.5583e-04 3.3243e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 417 lppM 5.5147e-04 6.7182e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 418 nuoF 1.6410e-04 1.3708e-04 2.4993e-04 0.0000e+00 0.0000e+00
## 419 pknB 0.0000e+00 1.2993e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 420 mpt63 4.3303e-03 4.3481e-03 9.7927e-04 7.7021e-04 4.0731e-03
## 421 gatA 0.0000e+00 0.0000e+00 1.5759e-04 0.0000e+00 0.0000e+00
## 422 fadE4 1.1020e-04 0.0000e+00 1.3706e-04 0.0000e+00 0.0000e+00
## 423 Rv3005c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 424 folD 3.7125e-04 2.5327e-04 1.4248e-03 1.3801e-03 2.7656e-04
## 425 thyX 8.3456e-04 8.9469e-04 5.7833e-04 4.0821e-04 0.0000e+00
## 426 trpA 0.0000e+00 0.0000e+00 7.4144e-04 1.5119e-04 0.0000e+00
## 427 Rv0999 1.2419e-04 0.0000e+00 5.7374e-04 9.7193e-04 0.0000e+00
## 428 pfkA 1.1862e-03 1.3635e-03 1.6537e-03 1.8447e-03 1.5105e-03
## 429 pepD 4.4966e-05 4.3823e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 430 bfr 8.2013e-03 9.7832e-03 1.0282e-02 1.9255e-02 1.9714e-02
## 431 hisG 1.3224e-03 1.0382e-03 9.7902e-04 1.0780e-03 1.8243e-04
## 432 acg 4.7275e-04 1.2286e-04 6.7200e-04 0.0000e+00 0.0000e+00
## 433 esxB 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 434 Rv2895c 1.9537e-03 1.8322e-03 6.2879e-04 5.0485e-04 9.1537e-04
## 435 Rv3196A 2.6870e-03 4.3132e-03 2.5277e-03 4.6387e-03 3.5325e-03
## 436 aldC 2.1093e-03 1.7652e-03 1.3444e-03 1.8840e-03 1.0817e-03
## 437 mtc28 3.7017e-04 2.9517e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 438 tpx 2.3393e-03 2.8344e-03 1.4829e-03 3.7110e-04 1.8840e-03
## 439 pknD 0.0000e+00 0.0000e+00 0.0000e+00 5.2256e-04 6.2421e-04
## 440 gabD1 1.9860e-03 2.2247e-03 1.2168e-03 1.0719e-03 1.9273e-03
## 441 nuoG 1.2943e-04 7.5684e-05 1.9318e-04 0.0000e+00 0.0000e+00
## 442 ppiB 3.3870e-04 3.9611e-04 1.1555e-03 2.3856e-03 2.3550e-03
## 443 pafA 0.0000e+00 0.0000e+00 4.9211e-04 4.5156e-04 0.0000e+00
## 444 Rv2766c 0.0000e+00 1.1731e-04 7.2719e-04 0.0000e+00 0.0000e+00
## 445 ponA1 0.0000e+00 0.0000e+00 9.4941e-05 1.9913e-04 0.0000e+00
## 446 Rv3627c 0.0000e+00 0.0000e+00 1.2063e-04 2.2137e-04 0.0000e+00
## 447 ceIA1 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 448 rpIR 7.6958e-04 8.3335e-04 1.2763e-03 1.6730e-03 2.7604e-03
## 449 Rv3572 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 450 argF 1.9029e-03 2.2851e-03 1.4129e-03 2.1940e-03 2.3627e-03
## 451 rph 2.2959e-03 2.1983e-03 2.4476e-03 2.7582e-03 2.7005e-03
## 452 map 3.2943e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 453 Rv3766 1.1422e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 454 galE1 0.0000e+00 0.0000e+00 2.4794e-04 0.0000e+00 0.0000e+00
## 455 fadE34 2.9345e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 456 Rv0637 0.0000e+00 0.0000e+00 1.3400e-04 0.0000e+00 0.0000e+00
## 457 Rv2326c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 458 purL 2.7238e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 459 Rv0552 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 460 ppsE 0.0000e+00 0.0000e+00 8.2217e-05 0.0000e+00 0.0000e+00
## 461 cysS 0.0000e+00 0.0000e+00 9.4854e-05 0.0000e+00 0.0000e+00
## 462 ltp4 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 463 Rv2129c 0.0000e+00 0.0000e+00 5.6937e-04 0.0000e+00 0.0000e+00
## 464 adhC 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 465 phoU1 0.0000e+00 0.0000e+00 1.5097e-04 0.0000e+00 0.0000e+00
## 466 rpsD 0.0000e+00 0.0000e+00 6.0865e-04 0.0000e+00 0.0000e+00
## 467 Rv1987 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 468 Rv2632c 0.0000e+00 8.7457e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 469 purS 0.0000e+00 3.8609e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 470 cwsA 0.0000e+00 0.0000e+00 8.4371e-04 0.0000e+00 0.0000e+00
## 471 Rv2566 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 472 Rv0338c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 473 clpC1 0.0000e+00 0.0000e+00 2.6230e-05 0.0000e+00 0.0000e+00

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## 474      kgd 0.0000e+00 0.0000e+00 8.1312e-05 0.0000e+00 0.0000e+00
## 475      fgd1 0.0000e+00 0.0000e+00 2.3170e-04 0.0000e+00 0.0000e+00
## 476      fadE9 0.0000e+00 0.0000e+00 8.5551e-05 0.0000e+00 0.0000e+00
## 477      mmpL3 2.2102e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 478      Rv2315c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 479      Rv0826 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 480      rpsB 0.0000e+00 0.0000e+00 1.1625e-04 0.0000e+00 0.0000e+00
## 481      Rv1774 4.6780e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 482      rplW 0.0000e+00 0.0000e+00 6.6730e-04 0.0000e+00 0.0000e+00
## 483      Rv1770 0.0000e+00 0.0000e+00 5.1970e-05 0.0000e+00 0.0000e+00
## 484      Rv3131 0.0000e+00 0.0000e+00 7.4360e-04 0.0000e+00 0.0000e+00
## 485      mviN 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 486      Rv2172c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 487      Rv1096 2.1509e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 488      Rv2035 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 489      pyrC 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 490      mftC 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 1.3251e-04
## 491      rplA 0.0000e+00 0.0000e+00 1.8930e-04 0.0000e+00 0.0000e+00
## 492      mutT1 0.0000e+00 0.0000e+00 2.4559e-04 0.0000e+00 0.0000e+00
## 493      Rv3777 0.0000e+00 0.0000e+00 1.3563e-04 0.0000e+00 0.0000e+00
## 494      cysM 0.0000e+00 0.0000e+00 3.4432e-04 0.0000e+00 0.0000e+00
## 495      rpsH 0.0000e+00 0.0000e+00 2.5277e-04 0.0000e+00 0.0000e+00
## 496      Rv1869c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 497      secF 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 498      smpB 0.0000e+00 0.0000e+00 2.7804e-04 0.0000e+00 0.0000e+00
## 499      Rv1455 0.0000e+00 0.0000e+00 1.9376e-04 0.0000e+00 0.0000e+00
## 500      lpqE 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 501      vapC27 0.0000e+00 0.0000e+00 5.6826e-04 0.0000e+00 0.0000e+00
## 502      Rv0480c 0.0000e+00 2.1786e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 503      pyrF 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 504      rskA 0.0000e+00 0.0000e+00 0.0000e+00 4.3988e-04 0.0000e+00
## 505      Rv0141c 3.8353e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 506      Rv1928c 8.1820e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 507      pra 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 508      Rv0307c 0.0000e+00 0.0000e+00 5.5608e-04 0.0000e+00 0.0000e+00
## 509      acyP 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 510      ispF 0.0000e+00 0.0000e+00 2.0984e-04 0.0000e+00 0.0000e+00
## 511      sigA 0.0000e+00 0.0000e+00 2.7383e-04 0.0000e+00 0.0000e+00
## 512      htrA 0.0000e+00 1.9256e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 513      fadE15 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 514      tesA 0.0000e+00 0.0000e+00 1.2784e-04 0.0000e+00 0.0000e+00
## 515      aroG 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 516      mkl 0.0000e+00 0.0000e+00 1.5490e-04 0.0000e+00 0.0000e+00
## 517      Rv0078A 0.0000e+00 6.7091e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 518      vapC10 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 519      Rv0347 0.0000e+00 0.0000e+00 1.0172e-04 0.0000e+00 0.0000e+00
## 520      murF 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 521      far 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 522      hemD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 523      Rv3534c 6.0301e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 524      Rv1879 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 525      Rv0309 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 526      Rv2298 0.0000e+00 0.0000e+00 2.0659e-04 0.0000e+00 0.0000e+00
## 527      rplI 3.4316e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 528      cobT 0.0000e+00 0.0000e+00 2.7727e-04 0.0000e+00 0.0000e+00
## 529      lpqO 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 530      rpsI 0.0000e+00 0.0000e+00 5.8923e-04 0.0000e+00 0.0000e+00
## 531      Rv1341 0.0000e+00 2.4919e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 532      Rv1544 0.0000e+00 0.0000e+00 1.6662e-04 0.0000e+00 0.0000e+00
## 533      rplN 0.0000e+00 0.0000e+00 5.4697e-04 0.0000e+00 0.0000e+00
## 534      Rv0036c 1.6237e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 535      rbpA 0.0000e+00 0.0000e+00 2.0039e-04 0.0000e+00 0.0000e+00
## 536      Rv0390 0.0000e+00 5.8097e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 537      vapC13 0.0000e+00 0.0000e+00 2.5469e-04 0.0000e+00 0.0000e+00
## 538      Rv0178 0.0000e+00 0.0000e+00 0.0000e+00 2.5095e-04 0.0000e+00
## 539      rpsR2 0.0000e+00 0.0000e+00 3.7915e-04 0.0000e+00 0.0000e+00
## 540      rplJ 0.0000e+00 0.0000e+00 5.6233e-04 0.0000e+00 0.0000e+00
## 541      vapC33 0.0000e+00 0.0000e+00 9.3329e-04 0.0000e+00 0.0000e+00
## 542      Rv3827c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00

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## 543      dnaG 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 544 Rv1443c 0.0000e+00 0.0000e+00 2.7631e-04 0.0000e+00 0.0000e+00
## 545      sucD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 546      amIB2 0.0000e+00 0.0000e+00 1.6851e-04 0.0000e+00 0.0000e+00
## 547      echA18 0.0000e+00 9.5464e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 548      cmaA1 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 549 Rv2159c 0.0000e+00 0.0000e+00 6.4661e-05 0.0000e+00 0.0000e+00
## 550      pncB2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 551 Rv0580c 0.0000e+00 0.0000e+00 5.4585e-04 0.0000e+00 0.0000e+00
## 552      echA14 0.0000e+00 0.0000e+00 1.3033e-04 0.0000e+00 0.0000e+00
## 553      hadB 0.0000e+00 0.0000e+00 4.6993e-04 0.0000e+00 0.0000e+00
## 554      hsp 0.0000e+00 5.1154e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 555 Rv0180c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 1.3547e-04 0.0000e+00
## 556      tmk 0.0000e+00 0.0000e+00 4.6773e-04 0.0000e+00 0.0000e+00
## 557 Rv0801 0.0000e+00 3.5363e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 558 Rv2704 0.0000e+00 0.0000e+00 4.6993e-04 0.0000e+00 0.0000e+00
## 559      gadB 0.0000e+00 0.0000e+00 7.2533e-05 0.0000e+00 0.0000e+00
## 560      glnD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 6.4121e-05
## 561      eccA2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 562 Rv0007 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 7.6692e-04
## 563      fadE30 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 2.0186e-04
## 564      nuoI 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 565      prfA 0.0000e+00 1.4239e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 566      moxR1 0.0000e+00 0.0000e+00 2.0650e-04 0.0000e+00 0.0000e+00
## 567      glgC 0.0000e+00 0.0000e+00 1.9270e-04 0.0000e+00 0.0000e+00
## 568 Rv3415c 0.0000e+00 0.0000e+00 0.0000e+00 1.4844e-04 0.0000e+00
## 569 Rv3551 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 570 Rv0679c 0.0000e+00 0.0000e+00 8.0885e-04 0.0000e+00 0.0000e+00
## 571 Rv0311 1.0202e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 572      mmaA1 0.0000e+00 1.4219e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 573 Rv0988 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 574 Rv2294 0.0000e+00 0.0000e+00 4.0989e-04 0.0000e+00 0.0000e+00
## 575 Rv2576c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 576 Rv1780 0.0000e+00 0.0000e+00 8.3264e-04 0.0000e+00 0.0000e+00
## 577      espH 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 7.0778e-04
## 578      clpP2 0.0000e+00 0.0000e+00 5.7167e-04 0.0000e+00 0.0000e+00
## 579      mhuD 0.0000e+00 2.0334e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 580      mazF6 0.0000e+00 4.4592e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 581      espF 0.0000e+00 0.0000e+00 8.6382e-04 0.0000e+00 0.0000e+00
## 582 Rv3678c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 583      nrdZ 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 584      mmaA3 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 585      hisN 0.0000e+00 0.0000e+00 1.2833e-04 0.0000e+00 0.0000e+00
## 586      tig 2.4625e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 587 Rv1111c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 588      fadD28 0.0000e+00 0.0000e+00 2.3010e-04 0.0000e+00 0.0000e+00
## 589      lpqL 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 590      higB2 0.0000e+00 0.0000e+00 1.1066e-04 0.0000e+00 0.0000e+00
## 591      ackA 0.0000e+00 0.0000e+00 1.1555e-04 0.0000e+00 0.0000e+00
## 592      nuoE 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 593      fmt 0.0000e+00 0.0000e+00 1.0694e-04 0.0000e+00 0.0000e+00
## 594      mmpS3 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 595      arfA 0.0000e+00 3.1187e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 596      manA 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 597      cspB 0.0000e+00 0.0000e+00 2.4715e-04 0.0000e+00 0.0000e+00
## 598      etfA 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 599      hisD 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 600      trxB1 0.0000e+00 9.9189e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 601      glpQ1 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 602      guaB3 0.0000e+00 0.0000e+00 1.4829e-04 0.0000e+00 0.0000e+00
## 603      cydA 0.0000e+00 0.0000e+00 0.0000e+00 1.2625e-04 0.0000e+00
## 604 Rv1144 0.0000e+00 0.0000e+00 2.2243e-04 0.0000e+00 0.0000e+00
## 605 Rv0492c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 606      dxs2 0.0000e+00 5.6904e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 607      bpa 0.0000e+00 1.7529e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 608      hns 0.0000e+00 0.0000e+00 1.3280e-03 1.5232e-03 2.7065e-03
## 609 Rv2716 8.6934e-04 1.0702e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 610 Rv0081 1.3726e-03 1.6945e-03 1.8536e-03 0.0000e+00 0.0000e+00
## 611 Rv0315 2.5548e-03 2.6628e-03 4.1612e-04 4.8596e-04 2.1147e-03

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## 612      ephB 1.0256e-03 9.4244e-04 4.3737e-04 0.0000e+00 2.9107e-04
## 613 Rv0163 6.2178e-04 5.3864e-04 4.4192e-04 0.0000e+00 0.0000e+00
## 614      ilvD 8.7085e-04 6.7190e-04 1.4893e-03 1.6683e-03 5.4062e-04
## 615 Rv3369 1.1591e-03 1.2709e-03 0.0000e+00 0.0000e+00 1.2593e-03
## 616      arcA 2.4653e-03 1.7198e-03 3.7072e-03 3.2494e-03 1.6754e-03
## 617      dcd 1.1530e-03 1.0702e-03 1.1122e-03 2.0410e-03 1.3634e-03
## 618 Rv2969c 3.2728e-04 2.7909e-04 1.3957e-03 2.5613e-03 1.8286e-03
## 619 Rv0331 8.3349e-04 8.6471e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 620      ansA 2.3182e-04 9.6828e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 621      fecB 1.0752e-03 1.1045e-03 2.7882e-04 3.9798e-04 3.6079e-04
## 622      atpA 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 2.3593e-04
## 623      purK 2.9181e-04 1.4219e-04 3.1110e-04 3.8061e-04 0.0000e+00
## 624      ndkA 3.7586e-03 4.3359e-03 3.8435e-03 4.0521e-03 5.9048e-03
## 625      fadA6 5.4052e-04 3.6875e-04 4.8981e-04 1.0575e-04 0.0000e+00
## 626 Rv1636 1.4290e-04 6.2673e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 627      mpt64 1.0615e-02 1.2218e-02 4.3901e-03 4.9236e-03 7.3852e-03
## 628      folB 7.8436e-04 1.1466e-03 6.6897e-04 0.0000e+00 3.8955e-04
## 629 Rv2280 9.0911e-04 4.6515e-04 7.5114e-04 4.8914e-04 3.9506e-04
## 630      cfp32 2.4781e-03 2.8826e-03 4.6873e-04 1.0166e-03 9.9252e-04
## 631      ggtB 1.2979e-03 1.2966e-03 9.3401e-04 1.0475e-03 1.0878e-03
## 632      mycP5 2.4966e-04 1.9117e-04 3.4221e-04 8.3735e-04 0.0000e+00
## 633 Rv2003c 2.5623e-04 1.0702e-04 7.0242e-04 0.0000e+00 0.0000e+00
## 634 Rv0310c 3.2000e-04 4.3662e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 635      pstB2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 636      pcd 4.2235e-05 4.1162e-05 9.0054e-05 0.0000e+00 0.0000e+00
## 637      cmaA2 1.1054e-03 9.7629e-04 7.3653e-05 0.0000e+00 0.0000e+00
## 638      coaX 1.9944e-03 1.7194e-03 2.9031e-03 3.3017e-03 2.6667e-03
## 639      lpdC 1.2051e-02 1.1920e-02 6.7593e-03 9.8973e-03 1.7195e-02
## 640      ephG 0.0000e+00 0.0000e+00 1.1943e-03 0.0000e+00 0.0000e+00
## 641      lppX 3.2236e-03 3.0544e-03 5.8711e-03 1.2702e-02 9.1167e-03
## 642 Rv0526 9.1763e-04 9.8845e-04 4.1191e-04 0.0000e+00 0.0000e+00
## 643      hrp1 1.0213e-03 1.4219e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 644 Rv3212 2.0505e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 645      fadE27 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 646      lprG 1.2377e-03 1.2924e-03 4.0999e-03 7.5242e-03 5.2688e-03
## 647      pepA 5.2895e-04 4.8687e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 648 Rv2558 1.3261e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 649      trxB 2.1798e-04 2.1244e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 650      greA 2.5444e-04 1.2399e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 651      glgB 2.8542e-04 3.8943e-04 2.5864e-04 0.0000e+00 0.0000e+00
## 652      deoC 4.6572e-04 4.5388e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 653      mtb12 1.1798e-03 1.9971e-03 0.0000e+00 0.0000e+00 1.2336e-03
## 654 Rv0457c 1.4106e-03 1.3747e-03 2.1483e-04 0.0000e+00 3.0793e-04
## 655      tyrA 4.1987e-04 2.5181e-04 6.1978e-04 5.0552e-04 0.0000e+00
## 656      cyp142 1.1009e-03 1.0473e-03 2.7944e-04 0.0000e+00 0.0000e+00
## 657      fadA3 6.9032e-03 6.9286e-03 3.8720e-03 3.1750e-03 6.0125e-03
## 658      rp1V 0.0000e+00 0.0000e+00 7.3392e-04 1.1397e-03 1.3150e-03
## 659      gatB 5.5337e-04 2.1972e-04 1.1581e-03 9.6238e-04 1.5268e-04
## 660      pyrH 0.0000e+00 0.0000e+00 6.3918e-04 0.0000e+00 0.0000e+00
## 661 Rv0546c 1.7930e-03 1.7474e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 662      glpX 5.1872e-04 5.6171e-04 3.6867e-04 2.8191e-04 0.0000e+00
## 663      leuA 3.0940e-03 3.2364e-03 2.9358e-03 3.0426e-03 3.4593e-03
## 664      bg1S 1.0568e-04 1.4713e-04 1.1267e-04 0.0000e+00 0.0000e+00
## 665 Rv0227c 0.0000e+00 0.0000e+00 0.0000e+00 5.3329e-04 5.5379e-04
## 666 Rv2765 1.0219e-03 1.4939e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 667 Rv1762c 4.7780e-04 2.3283e-04 1.6980e-03 0.0000e+00 0.0000e+00
## 668      glnA3 3.9410e-04 2.9371e-04 9.1445e-04 5.4428e-04 4.0296e-04
## 669      mpt53 2.3517e-03 3.6436e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 670      dhaA 1.5648e-03 1.4573e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 671      lpqI 1.2906e-03 9.4332e-04 1.1466e-03 2.2620e-03 2.6038e-03
## 672      lppY 0.0000e+00 0.0000e+00 5.5435e-04 1.5896e-03 0.0000e+00
## 673      eis 3.6071e-03 3.6925e-03 4.3712e-03 4.9757e-03 4.7041e-03
## 674      gmdA 0.0000e+00 0.0000e+00 8.1777e-04 9.0046e-04 0.0000e+00
## 675      fadE5 1.7074e-05 1.6640e-05 3.6405e-05 0.0000e+00 0.0000e+00
## 676      pyrB 6.2134e-04 2.8684e-04 2.1267e-03 2.6233e-03 9.7448e-04
## 677      folE 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 678 Rv2499c 0.0000e+00 0.0000e+00 6.0117e-04 0.0000e+00 0.0000e+00
## 679 Rv2923c 1.1422e-03 2.0779e-03 0.0000e+00 0.0000e+00 7.5635e-04
## 680 Rv1498A 1.0134e-02 6.1001e-03 4.6075e-03 5.2484e-03 9.9919e-03

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## 681      kasB 2.5017e-04 0.0000e+00 7.7345e-04 0.0000e+00 1.8637e-04
## 682      mycP2 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 683      rraA 5.9802e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 684 Rv0247c 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 2.0891e-04
## 685 Rv1532c 0.0000e+00 0.0000e+00 4.6340e-04 0.0000e+00 0.0000e+00
## 686      mce2D 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 687      Rv2799 6.4888e-04 7.2968e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 688      accD1 1.8734e-03 1.6336e-03 1.8501e-03 1.2732e-03 8.8145e-04
## 689      phoU2 1.2734e-03 1.1456e-03 1.6709e-03 1.2457e-03 1.5810e-03
## 690      rp1B 1.7511e-03 1.2346e-03 3.4557e-03 5.8316e-03 5.7361e-03
## 691      metB 1.5057e-03 1.1792e-03 1.7485e-03 2.1042e-03 6.6765e-04
## 692      Rv3732 0.0000e+00 0.0000e+00 2.8436e-04 7.5379e-04 3.6797e-04
## 693      fadD13 4.9775e-04 3.8404e-04 3.9799e-04 0.0000e+00 0.0000e+00
## 694      ribH 1.1736e-03 1.5250e-03 1.4597e-03 7.6539e-04 0.0000e+00
## 695      mpt70 1.3513e-03 1.3696e-03 0.0000e+00 0.0000e+00 5.3689e-04
## 696      Rv2140c 6.7571e-03 6.9320e-03 1.2006e-03 6.9581e-04 2.7965e-03
## 697      Rv0052 0.0000e+00 0.0000e+00 1.7248e-03 2.8378e-03 0.0000e+00
## 698      pta 1.0583e-04 1.0314e-04 8.0592e-04 7.3951e-04 3.7543e-04
## 699      Rv3510c 5.2535e-04 5.1200e-04 5.2008e-04 2.9368e-04 0.0000e+00
## 700      gpgP 4.2102e-04 5.0151e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 701      mak 8.2539e-04 7.1504e-04 5.1331e-04 3.1401e-04 0.0000e+00
## 702      secE2 1.0285e-02 1.0167e-02 1.0652e-02 1.2361e-02 9.8511e-03
## 703      sodB 8.4162e-03 9.4302e-03 5.8026e-03 5.7189e-03 7.5086e-03
## 704      pgi 5.6971e-03 5.7913e-03 4.4648e-03 1.9562e-03 4.1691e-03
## 705      prcB 3.0472e-03 3.4239e-03 1.9109e-03 3.4368e-03 3.3828e-03
## 706      Rv1265 0.0000e+00 0.0000e+00 6.8895e-04 6.3218e-04 0.0000e+00
## 707      lpqW 6.5714e-05 1.2809e-04 1.4012e-04 0.0000e+00 0.0000e+00
## 708      echA3 8.3998e-03 1.0035e-02 5.4405e-03 5.4781e-03 5.6071e-03
## 709      Rv0712 2.0934e-04 0.0000e+00 3.3477e-04 0.0000e+00 0.0000e+00
## 710      glnA4 2.3740e-03 2.1580e-03 2.6527e-03 3.2156e-03 3.5711e-03
## 711      Rv2857c 8.8955e-04 6.6991e-04 3.0175e-04 0.0000e+00 0.0000e+00
## 712      tata 1.0055e-03 0.0000e+00 5.3598e-03 7.6232e-03 8.7390e-03
## 713      citA 3.8596e-03 4.2249e-03 3.4587e-03 2.7907e-03 4.7226e-03
## 714      Rv1287 1.9439e-04 0.0000e+00 1.5888e-03 2.9158e-03 6.4360e-04
## 715      lpz 3.4401e-03 3.1346e-03 2.6239e-03 4.6512e-03 3.4725e-03
## 716      nrdF2 1.2235e-03 1.0355e-03 1.0984e-03 4.4097e-04 7.9953e-05
## 717      aroC 2.1072e-03 1.8508e-03 1.8028e-03 2.0360e-03 1.4858e-03
## 718      Rv1531 1.1653e-03 1.6224e-03 6.5074e-04 0.0000e+00 0.0000e+00
## 719      lpqG 0.0000e+00 0.0000e+00 4.6340e-04 5.9530e-04 0.0000e+00
## 720      Rv3210c 5.4192e-04 3.5210e-04 5.2960e-04 0.0000e+00 0.0000e+00
## 721      icd 2.1170e-03 1.9141e-03 5.9823e-04 2.4952e-04 5.7003e-04
## 722      dppA 3.0853e-04 2.6310e-04 1.4390e-04 0.0000e+00 0.0000e+00
## 723      Rv0787 1.6351e-04 2.5497e-04 0.0000e+00 0.0000e+00 2.4362e-04
## 724      Rv1836c 4.1605e-04 4.9558e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 725      pstS3 1.1560e-03 1.0167e-03 9.0176e-04 7.1712e-04 0.0000e+00
## 726      Rv0799c 1.2145e-03 1.1533e-03 4.0503e-03 2.1934e-03 2.3198e-03
## 727      Rv2141c 1.3506e-03 1.3843e-03 7.6958e-04 1.8224e-04 4.0476e-04
## 728      glgE 2.0090e-03 1.6534e-03 5.7592e-03 7.1335e-03 4.9149e-03
## 729      vapC3 3.0459e-04 2.9684e-04 6.4944e-04 0.0000e+00 0.0000e+00
## 730      lppL 2.9140e-04 2.5559e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 731      garA 3.1554e-03 3.9538e-03 3.4326e-04 0.0000e+00 6.3963e-04
## 732      hbhA 0.0000e+00 0.0000e+00 7.8243e-04 9.2309e-04 0.0000e+00
## 733      Rv2250A 1.6511e-03 1.9749e-03 6.4010e-04 0.0000e+00 0.0000e+00
## 734      gnd2 2.2091e-03 2.0633e-03 1.7991e-03 2.4012e-03 2.4381e-03
## 735      eccB5 5.5665e-04 4.8222e-04 1.0990e-04 0.0000e+00 0.0000e+00
## 736      Rv3722c 3.3814e-03 3.3422e-03 3.0680e-03 2.2053e-03 1.8461e-03
## 737      fumC 3.0152e-03 2.1235e-03 6.4055e-03 6.4159e-03 5.0826e-03
## 738      lpqK 0.0000e+00 0.0000e+00 1.9035e-04 2.4952e-04 0.0000e+00
## 739      Rv0296c 2.1313e-03 2.2958e-03 1.6264e-03 7.4619e-04 8.3564e-04
## 740      moaE2 1.2578e-03 1.0095e-03 8.6765e-04 0.0000e+00 5.5117e-04
## 741      trpC 3.8353e-04 2.9903e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 742      purU 7.7399e-04 2.9517e-04 4.6639e-04 0.0000e+00 0.0000e+00
## 743      mmaA4 8.3179e-04 6.0799e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 744      ppa 2.8334e-03 3.4517e-03 2.3342e-03 8.8193e-04 1.4392e-03
## 745      Rv2557 6.9857e-04 9.0776e-04 0.0000e+00 4.5559e-04 1.5034e-03
## 746      Rv1700 5.5436e-04 4.9115e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 747      lpqK 0.0000e+00 0.0000e+00 9.4152e-04 1.1879e-03 1.2336e-03
## 748      prcA 2.3136e-03 1.5988e-03 4.8433e-03 5.2672e-03 5.6406e-03
## 749      lprF 7.5942e-04 3.8954e-04 1.9175e-03 4.3011e-03 3.4738e-03

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## 750 Rv2135c 0.0000e+00 0.0000e+00 2.3563e-04 0.0000e+00 0.0000e+00
## 751 trxA 1.9785e-03 2.5417e-03 0.0000e+00 0.0000e+00 1.5632e-03
## 752 tpiA 4.6365e-03 4.7913e-03 2.4289e-03 1.1730e-03 2.6798e-03
## 753 vapC4 0.0000e+00 0.0000e+00 1.1977e-03 6.2801e-04 0.0000e+00
## 754 Rv3668c 6.2952e-04 8.7646e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 755 mycP3 4.7521e-04 5.5135e-04 4.8250e-05 0.0000e+00 4.4954e-04
## 756 lpqH 2.1651e-03 1.5986e-03 7.8341e-03 2.1437e-02 2.0528e-02
## 757 Rv0048c 0.0000e+00 0.0000e+00 1.5393e-03 1.1300e-03 0.0000e+00
## 758 rpIQ 6.9547e-04 5.6483e-04 2.0390e-03 1.1339e-03 1.4392e-03
## 759 pcp 0.0000e+00 0.0000e+00 5.0098e-04 5.5163e-04 0.0000e+00
## 760 cfp29 7.1647e-03 6.7140e-03 4.9901e-02 1.8254e-02 2.8055e-02
## 761 mmpR5 1.3277e-03 1.4788e-03 8.0885e-04 0.0000e+00 3.1400e-04
## 762 ceoB 2.0680e-03 2.5081e-03 2.3517e-03 3.5966e-03 3.4235e-03
## 763 purA 5.7956e-04 4.2362e-04 9.5255e-04 1.1339e-03 0.0000e+00
## 764 gpm2 1.8500e-03 1.7529e-03 4.9308e-04 0.0000e+00 7.6566e-04
## 765 rpID 1.1227e-03 3.6473e-04 1.9949e-03 2.7458e-03 6.9699e-04
## 766 Rv3401 1.2874e-03 1.0995e-03 1.6838e-03 1.2464e-03 7.9099e-04
## 767 punA 9.3421e-04 9.8634e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 768 echA15 1.3985e-03 1.3630e-03 1.5312e-03 1.2572e-03 2.0649e-03
## 769 lprQ 5.3201e-04 5.1849e-04 3.9456e-04 2.2628e-04 0.0000e+00
## 770 rpiB 2.3826e-03 2.8241e-03 0.0000e+00 0.0000e+00 1.5991e-03
## 771 Rv0968 0.0000e+00 0.0000e+00 2.2697e-03 2.0827e-03 1.3217e-03
## 772 lpqN 1.1439e-03 7.5806e-04 1.7561e-03 2.6856e-03 2.4996e-03
## 773 pat 1.3299e-03 1.5553e-03 7.8765e-04 2.3128e-04 0.0000e+00
## 774 caeA 2.0062e-04 2.5417e-04 8.5551e-05 0.0000e+00 0.0000e+00
## 775 sseC1 7.3024e-04 0.0000e+00 4.4487e-04 0.0000e+00 0.0000e+00
## 776 Rv3224 2.4046e-03 2.0550e-03 1.4198e-03 1.1580e-03 0.0000e+00
## 777 Rv0161 1.4405e-03 1.4265e-03 7.1833e-04 4.5458e-04 2.3078e-04
## 778 adk 3.5158e-03 4.2690e-03 0.0000e+00 0.0000e+00 8.5872e-04
## 779 Rv0398c 1.2734e-03 1.2410e-03 0.0000e+00 0.0000e+00 7.2971e-04
## 780 nat 6.2666e-04 7.5443e-04 5.8949e-04 0.0000e+00 0.0000e+00
## 781 hisB 1.6393e-03 1.5977e-03 1.0062e-03 0.0000e+00 1.3569e-03
## 782 ssb 9.8596e-03 6.6953e-03 4.1774e-02 7.1312e-02 7.5345e-02
## 783 glnA2 1.7543e-03 1.4589e-03 3.0423e-03 2.9746e-03 2.7880e-03
## 784 Rv2575 7.8329e-04 6.9399e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 785 vapC51 7.6146e-04 6.6790e-04 4.8708e-04 1.1919e-03 1.5127e-03
## 786 csor 9.6431e-04 0.0000e+00 1.9626e-03 2.9158e-03 3.7007e-03
## 787 Rv1314c 2.5404e-03 2.6339e-03 2.4203e-03 1.3748e-03 0.0000e+00
## 788 Rv3531c 2.5037e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 789 accD3 5.6902e-04 6.1618e-04 7.4144e-04 6.1850e-04 7.8500e-04
## 790 argC 4.1491e-04 0.0000e+00 1.6430e-03 1.6815e-03 0.0000e+00
## 791 vapC11 1.4013e-03 1.3657e-03 1.8259e-03 1.9801e-03 1.3532e-03
## 792 Rv0953c 0.0000e+00 0.0000e+00 8.2821e-04 5.0664e-04 0.0000e+00
## S1_F5 S1_qEV S2_100R S2_F1 S2_F2 S2_F3
## 1 2.5384e-04 1.3804e-03 1.9801e-03 2.3668e-03 1.7658e-03 2.4713e-03
## 2 0.0000e+00 6.4237e-04 3.3204e-04 4.1420e-04 4.9612e-04 4.8106e-04
## 3 1.9906e-04 3.0672e-04 1.0492e-03 1.1898e-03 8.9878e-04 1.6721e-03
## 4 1.7183e-03 2.7926e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 5 0.0000e+00 2.3447e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 6 0.0000e+00 9.7783e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 7 2.3491e-04 3.4065e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 8 2.1989e-03 7.0341e-04 5.9994e-04 4.9479e-04 6.1118e-04 0.0000e+00
## 9 4.6599e-04 2.9240e-04 9.0685e-05 1.0284e-04 0.0000e+00 0.0000e+00
## 10 2.9704e-04 1.2564e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 11 0.0000e+00 1.5096e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 12 4.6867e-04 6.0684e-04 0.0000e+00 0.0000e+00 1.4060e-04 0.0000e+00
## 13 0.0000e+00 3.0404e-04 0.0000e+00 0.0000e+00 0.0000e+00 5.9112e-05
## 14 1.3859e-04 1.4445e-03 4.8696e-05 0.0000e+00 0.0000e+00 7.0551e-05
## 15 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 16 5.0661e-04 5.5101e-04 7.9037e-04 8.4785e-04 2.3938e-04 1.9343e-04
## 17 0.0000e+00 3.1789e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 18 9.5688e-05 2.6018e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 19 1.9131e-03 1.3486e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 20 0.0000e+00 4.4436e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 21 1.0649e-03 0.0000e+00 4.8982e-04 6.9433e-04 1.0165e-03 7.3921e-04
## 22 2.7734e-03 2.4132e-03 8.0456e-03 8.2752e-03 9.2024e-03 1.1013e-02
## 23 0.0000e+00 0.0000e+00 1.0463e-03 6.5257e-04 9.1192e-04 1.0421e-03
## 24 0.0000e+00 0.0000e+00 1.3535e-03 1.4409e-03 9.9741e-04 1.5508e-03
## 25 3.8864e-03 3.3337e-03 5.4720e-03 5.8736e-03 4.5908e-03 5.1404e-03

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## 26 0.0000e+00 0.0000e+00 1.2387e-03 1.0607e-03 1.0387e-03 8.2407e-04
## 27 1.8924e-03 1.6080e-03 5.8848e-03 6.2776e-03 3.2911e-03 4.6964e-03
## 28 0.0000e+00 0.0000e+00 7.3020e-04 9.5880e-04 1.4356e-04 7.6559e-04
## 29 0.0000e+00 0.0000e+00 2.3889e-03 3.0961e-03 1.2748e-03 1.6481e-03
## 30 2.9512e-04 0.0000e+00 1.4755e-03 1.7941e-03 1.1067e-03 1.3521e-03
## 31 3.9787e-04 0.0000e+00 3.5565e-03 4.0332e-03 3.5510e-03 2.9166e-03
## 32 0.0000e+00 0.0000e+00 1.0176e-03 1.1265e-03 0.0000e+00 7.4592e-04
## 33 0.0000e+00 0.0000e+00 1.0641e-03 1.5822e-03 8.5387e-04 6.8520e-04
## 34 0.0000e+00 0.0000e+00 8.9355e-04 1.1400e-03 6.9536e-04 6.5740e-04
## 35 0.0000e+00 1.1245e-04 2.1710e-03 1.9281e-03 1.0748e-03 1.8948e-03
## 36 0.0000e+00 0.0000e+00 6.0440e-04 7.6604e-04 3.3201e-04 5.7948e-04
## 37 4.9777e-03 2.8475e-03 9.2557e-03 1.0106e-02 7.3260e-03 1.0126e-02
## 38 4.1927e-04 0.0000e+00 2.3424e-03 3.0573e-03 2.2012e-03 1.5207e-03
## 39 0.0000e+00 2.3200e-03 2.0237e-04 1.1475e-03 0.0000e+00 0.0000e+00
## 40 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 41 5.2184e-04 9.4594e-04 0.0000e+00 0.0000e+00 0.0000e+00 2.9886e-04
## 42 1.3420e-04 1.2468e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 43 0.0000e+00 2.2582e-04 2.0223e-03 2.2934e-03 1.4716e-03 2.2831e-03
## 44 2.1250e-03 1.5073e-03 2.5322e-03 3.3575e-03 3.4440e-03 3.4570e-03
## 45 1.2313e-03 2.6504e-03 5.5161e-04 4.0476e-04 6.0602e-04 4.7010e-04
## 46 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 47 9.8623e-04 1.2770e-03 1.3069e-03 1.0779e-03 1.0540e-03 1.5600e-03
## 48 5.7570e-04 1.7219e-03 1.0195e-03 4.4044e-04 8.1606e-04 7.9129e-04
## 49 8.9788e-03 8.3075e-03 1.1161e-02 1.3640e-02 1.7874e-02 8.8560e-03
## 50 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 51 8.8788e-04 6.1539e-04 2.5105e-03 3.0468e-03 2.1114e-03 2.6322e-03
## 52 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 53 1.1887e-03 4.1556e-03 2.0049e-03 2.0300e-03 8.0239e-04 9.0770e-04
## 54 0.0000e+00 5.1114e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 55 4.1450e-04 0.0000e+00 5.8259e-04 0.0000e+00 1.4508e-04 0.0000e+00
## 56 0.0000e+00 1.2900e-03 2.4005e-03 1.8472e-03 1.6012e-03 2.5618e-03
## 57 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 58 0.0000e+00 3.3127e-04 1.8236e-03 2.0098e-03 2.8783e-03 1.8141e-03
## 59 1.0021e-03 1.5138e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 60 0.0000e+00 4.0998e-04 1.1825e-03 4.7583e-04 8.5492e-04 2.7632e-04
## 61 1.3391e-03 2.2251e-03 1.1292e-03 6.8298e-04 1.5935e-03 3.1017e-03
## 62 0.0000e+00 0.0000e+00 2.0214e-03 1.7381e-03 2.2403e-03 1.4482e-03
## 63 4.7185e-02 3.4870e-02 4.2955e-02 4.1871e-02 2.4873e-02 4.5306e-02
## 64 0.0000e+00 1.8099e-03 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 65 2.0678e-03 2.4364e-03 2.0054e-03 8.8987e-04 2.3884e-03 1.1053e-03
## 66 1.8649e-02 1.2435e-02 2.3399e-02 2.6005e-02 1.6455e-02 1.9761e-02
## 67 2.9575e-03 0.0000e+00 6.9280e-04 7.0709e-04 0.0000e+00 6.2733e-04
## 68 8.2088e-03 7.7347e-03 5.4146e-03 6.0626e-03 8.1073e-03 7.5095e-03
## 69 0.0000e+00 0.0000e+00 7.9280e-04 6.7429e-04 8.2261e-04 1.4357e-03
## 70 0.0000e+00 0.0000e+00 3.6936e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 71 0.0000e+00 0.0000e+00 9.2652e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 72 0.0000e+00 0.0000e+00 1.9718e-03 1.7702e-03 1.2276e-03 2.2319e-03
## 73 0.0000e+00 0.0000e+00 4.0053e-04 1.8168e-04 0.0000e+00 1.1606e-03
## 74 5.4934e-03 5.9084e-03 4.4164e-03 4.7982e-03 6.3065e-03 6.1524e-03
## 75 1.0832e-03 3.0680e-04 1.4273e-03 1.5862e-03 3.1277e-03 1.4992e-03
## 76 1.2159e-03 0.0000e+00 2.6488e-03 2.9554e-03 3.2981e-03 2.9401e-03
## 77 0.0000e+00 4.5917e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 78 2.6518e-02 2.2181e-02 1.5761e-02 1.5681e-02 1.6551e-02 1.9334e-02
## 79 1.5198e-03 2.5510e-03 1.4478e-03 8.0748e-04 5.9106e-04 6.4476e-04
## 80 3.4956e-03 3.9948e-03 1.0894e-03 6.5406e-04 2.1544e-03 2.0890e-03
## 81 1.3192e-03 1.0462e-03 3.0594e-03 3.6271e-03 3.0590e-03 2.6023e-03
## 82 1.2747e-03 9.7759e-04 1.9845e-03 1.5941e-03 1.8533e-03 8.2363e-04
## 83 0.0000e+00 0.0000e+00 6.8054e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 84 0.0000e+00 6.4284e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 85 3.2568e-03 1.5743e-03 1.9225e-03 2.4916e-03 3.1917e-03 2.7356e-03
## 86 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 87 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 88 3.2897e-03 2.7431e-03 4.4942e-03 3.7752e-03 4.9741e-03 5.5265e-03
## 89 0.0000e+00 4.0073e-04 3.0760e-03 3.9640e-03 1.3927e-03 2.1101e-03
## 90 0.0000e+00 0.0000e+00 2.1326e-04 9.6736e-05 1.0621e-04 0.0000e+00
## 91 0.0000e+00 6.5910e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 92 0.0000e+00 1.0699e-04 1.2444e-03 3.9512e-04 7.1271e-04 8.5634e-04
## 93 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 94 0.0000e+00 0.0000e+00 1.4188e-03 1.2872e-03 3.5333e-04 0.0000e+00
```

95 2.4125e-04 8.7461e-04 7.1205e-04 2.3071e-04 9.2881e-04 1.2281e-03
96 4.7127e-04 2.1357e-04 1.4572e-03 6.7603e-04 5.7731e-04 1.0796e-03
97 2.1278e-03 1.6924e-03 5.3648e-03 5.8969e-03 4.0352e-03 4.6091e-03
98 2.5630e-04 0.0000e+00 1.0158e-03 1.3236e-03 5.1132e-04 7.4370e-04
99 9.7126e-03 7.4989e-03 1.4751e-02 1.7416e-02 9.3957e-03 1.0644e-02
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102 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
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108 5.0036e-04 5.6688e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
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113 0.0000e+00 3.3113e-04 1.9102e-03 2.3060e-03 1.1125e-03 7.2535e-04
114 0.0000e+00 4.3386e-04 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
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129 0.0000e+00 0.0000e+00 5.6462e-04 0.0000e+00 5.6242e-04 0.0000e+00
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133 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
134 0.0000e+00 0.0000e+00 5.0066e-03 1.5897e-03 4.9871e-04 1.4507e-03
135 0.0000e+00 3.3530e-04 1.0659e-03 9.7290e-04 3.2370e-04 9.8872e-04
136 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
137 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
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139 1.3530e-03 1.9620e-03 3.1186e-03 2.5015e-03 2.7466e-03 3.0306e-03
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146 1.7370e-03 1.2370e-03 3.8712e-03 3.7375e-03 3.9082e-03 1.9895e-03
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## 790 0.0000e+00 7.8268e-04 2.1847e-04 0.0000e+00 1.1334e-03 9.8912e-04
## 791 0.0000e+00 1.6448e-03 8.6083e-04 0.0000e+00 2.2628e-03 3.1179e-03
## 792 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
##      S2_F4      S2_F5      S2_qEV      S3_100R      S3_F1      S3_F2
## 1  1.7908e-03 0.00040608 2.3565e-03 5.2050e-04 2.5256e-04 4.7574e-04
## 2  0.0000e+00 0.00000000 6.5545e-04 0.0000e+00 0.0000e+00 2.1085e-04
## 3  1.6172e-03 0.00140120 9.8137e-04 8.9801e-04 1.1092e-03 1.4923e-03
## 4  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 1.0800e-04 0.0000e+00
## 5  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 6  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 7  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 8  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 7.0729e-04 0.0000e+00
## 9  6.1307e-05 0.00000000 0.0000e+00 0.0000e+00 7.1331e-05 0.0000e+00
## 10 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 11 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 8.9190e-04
## 12 0.0000e+00 0.00000000 0.0000e+00 1.8305e-04 0.0000e+00 1.4341e-04
## 13 0.0000e+00 0.00000000 1.6521e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 14 0.0000e+00 0.00000000 4.4366e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 15 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 1.2331e-04
## 16 1.7329e-04 0.00000000 7.7847e-04 4.8479e-04 3.0245e-04 0.0000e+00
## 17 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 18 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 19 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 1.7074e-03
## 20 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 21 1.0762e-03 0.00000000 3.0990e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 22 1.3661e-02 0.01313300 5.2561e-03 1.4660e-03 1.3798e-03 2.0792e-03
## 23 4.2440e-04 0.00039696 1.1121e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 24 1.2885e-03 0.00097815 0.0000e+00 1.1941e-04 2.6073e-04 1.0524e-04
## 25 4.5698e-03 0.00592120 6.0873e-03 2.7829e-03 3.7288e-03 2.4527e-03
## 26 5.1271e-04 0.00000000 1.2284e-03 5.4639e-05 0.0000e+00 0.0000e+00
## 27 3.5401e-03 0.00302740 2.0446e-03 8.0843e-04 1.0591e-03 8.8670e-04
## 28 1.1302e-03 0.00116650 1.4297e-03 5.8145e-04 4.0810e-04 1.4642e-04
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## 30 1.6945e-03 0.00193340 8.0978e-05 8.4528e-04 9.6481e-04 4.9667e-04
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## 32 1.1793e-03 0.00134820 2.1338e-03 7.3314e-04 6.5749e-04 1.5385e-04
## 33 7.6736e-04 0.00041869 1.7954e-04 3.3222e-04 2.7901e-04 6.3067e-04
## 34 9.6275e-04 0.00113010 1.2720e-04 6.6389e-04 1.0213e-03 7.0925e-04
## 35 1.5384e-03 0.00105860 2.1448e-03 1.1307e-03 8.9499e-04 0.0000e+00
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636 0.0000e+00 0.00000000 6.6974e-04 0.0000e+00 0.0000e+00 0.0000e+00
637 0.0000e+00 0.00000000 2.5777e-04 3.2105e-04 2.5037e-04 0.0000e+00
638 1.8158e-03 0.00214540 3.0767e-03 2.1388e-03 1.9459e-03 3.0520e-03
639 2.1008e-02 0.02096000 9.3534e-03 1.2179e-02 1.6719e-02 1.5435e-02
640 0.0000e+00 0.00000000 6.5308e-04 1.0226e-03 8.1193e-04 9.8319e-04
641 8.0326e-03 0.00556540 1.4450e-02 4.5179e-03 4.6730e-03 1.3972e-02
642 7.2206e-04 0.00000000 9.0101e-04 1.5390e-03 2.4504e-03 3.7679e-04
643 0.0000e+00 0.00000000 1.2249e-03 9.6861e-04 1.2690e-03 0.0000e+00
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645 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 3.0547e-04
646 3.4145e-03 0.00233520 4.4531e-03 1.0564e-03 4.4854e-04 4.4831e-03
647 0.0000e+00 0.00000000 1.0964e-04 3.5115e-04 0.0000e+00 0.0000e+00
648 0.0000e+00 0.00000000 4.1233e-04 0.0000e+00 0.0000e+00 0.0000e+00
649 0.0000e+00 0.00000000 0.0000e+00 7.8558e-04 7.6740e-04 0.0000e+00
650 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 5.5325e-04 0.0000e+00
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654 5.0212e-04 0.00000000 0.0000e+00 6.3801e-04 7.1904e-04 0.0000e+00
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656 0.0000e+00 0.00000000 2.4449e-04 3.8282e-04 7.2192e-04 0.0000e+00
657 7.5094e-03 0.00920530 2.7391e-03 8.9604e-03 1.0754e-02 4.2602e-03
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660 0.0000e+00 0.00000000 2.9826e-04 0.0000e+00 0.0000e+00 0.0000e+00
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673 5.1730e-03 0.00653210 2.2754e-03 4.5481e-03 4.2508e-03 5.5472e-03
674 0.0000e+00 0.00000000 6.2964e-04 0.0000e+00 0.0000e+00 5.2662e-04
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676 2.4446e-04 0.00000000 2.6234e-03 4.3420e-04 9.4811e-05 2.9595e-03
677 0.0000e+00 0.00000000 4.8173e-04 0.0000e+00 0.0000e+00 3.2232e-04
678 0.0000e+00 0.00000000 4.2079e-04 0.0000e+00 0.0000e+00 0.0000e+00
679 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 1.5453e-03 0.0000e+00
680 1.0026e-02 0.01528300 5.8385e-03 7.9149e-03 7.9932e-03 8.1386e-03
681 0.0000e+00 0.00000000 4.2004e-04 9.9648e-05 0.0000e+00 3.5131e-04

```
## 682 0.0000e+00 0.00000000 7.0770e-05 0.0000e+00 0.0000e+00 0.0000e+00
## 683 0.0000e+00 0.00000000 0.0000e+00 7.0579e-04 0.0000e+00 0.0000e+00
## 684 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 685 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 686 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
## 687 6.2187e-04 0.00000000 0.0000e+00 8.6155e-04 9.4062e-04 0.0000e+00
## 688 7.8621e-04 0.00030642 2.5753e-03 2.3827e-03 2.5156e-03 1.2308e-03
## 689 0.0000e+00 0.00000000 1.9188e-03 7.1531e-04 7.8096e-04 1.1463e-03
## 690 2.6923e-03 0.00347340 4.9349e-03 1.4840e-03 2.0523e-03 3.8368e-03
## 691 6.0296e-04 0.00000000 3.7118e-03 2.1062e-03 1.6759e-03 2.4751e-03
## 692 0.0000e+00 0.00000000 6.6347e-04 0.0000e+00 0.0000e+00 6.0115e-04
## 693 0.0000e+00 0.00000000 1.1607e-03 4.6813e-04 2.4051e-04 1.6180e-04
## 694 0.0000e+00 0.00000000 1.7029e-03 1.3851e-03 1.7013e-03 0.0000e+00
## 695 0.0000e+00 0.00000000 0.0000e+00 1.1483e-03 1.0186e-03 0.0000e+00
## 696 2.8062e-03 0.00092099 8.8462e-04 4.6433e-03 4.7257e-03 3.6994e-04
## 697 0.0000e+00 0.00000000 1.6652e-03 0.0000e+00 0.0000e+00 1.4797e-03
## 698 1.1302e-04 0.00023492 2.0590e-03 2.6096e-04 0.0000e+00 9.9079e-04
## 699 2.8051e-04 0.00000000 1.4001e-04 7.4736e-04 5.4397e-04 7.6117e-04
## 700 0.0000e+00 0.00000000 0.0000e+00 3.1056e-04 0.0000e+00 0.0000e+00
## 701 2.2852e-04 0.00000000 6.8437e-04 8.2193e-04 7.3119e-04 0.0000e+00
## 702 1.0617e-02 0.01278500 1.6721e-02 9.1690e-03 6.1767e-03 9.8580e-03
## 703 8.0369e-03 0.00861370 3.7607e-03 8.3642e-03 1.0301e-02 7.4702e-03
## 704 4.4656e-03 0.00644860 1.8652e-03 6.3119e-03 7.9577e-03 4.2974e-03
## 705 1.7865e-03 0.00189390 3.6115e-03 3.6651e-03 4.0534e-03 1.7899e-03
## 706 0.0000e+00 0.00000000 7.7503e-04 0.0000e+00 5.3530e-04 7.9226e-04
## 707 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 1.4289e-04 5.1267e-05
## 708 7.4269e-03 0.00729770 3.5385e-03 6.8956e-03 8.3140e-03 7.8215e-03
## 709 0.0000e+00 0.00000000 0.0000e+00 2.7795e-04 1.5173e-04 0.0000e+00
## 710 2.1614e-03 0.00227000 4.2586e-03 2.5762e-03 1.9192e-03 2.1371e-03
## 711 0.0000e+00 0.00000000 0.0000e+00 9.1267e-04 1.3481e-03 1.0094e-03
## 712 6.5769e-03 0.00624940 5.1585e-03 0.0000e+00 0.0000e+00 4.5106e-03
## 713 3.5542e-03 0.00304200 3.2349e-03 4.7160e-03 5.2705e-03 5.0621e-03
## 714 0.0000e+00 0.00000000 1.9341e-03 0.0000e+00 0.0000e+00 2.0220e-03
## 715 3.9026e-03 0.00469330 2.5045e-03 3.6020e-03 4.7840e-03 3.0547e-03
## 716 6.4183e-04 0.00020012 1.2614e-03 1.4108e-03 1.5402e-03 8.5405e-04
## 717 6.4824e-04 0.00000000 3.8826e-03 2.1070e-03 1.0559e-03 7.3065e-04
## 718 9.6787e-04 0.00000000 0.0000e+00 8.8411e-04 9.6525e-04 0.0000e+00
## 719 0.0000e+00 0.00000000 7.2982e-04 0.0000e+00 0.0000e+00 3.3911e-04
## 720 0.0000e+00 0.00000000 0.0000e+00 1.7988e-04 5.2372e-04 1.4093e-04
## 721 1.0804e-03 0.00000000 3.3309e-04 2.8109e-03 2.4772e-03 1.1143e-03
## 722 0.0000e+00 0.00000000 0.0000e+00 4.3525e-04 3.0748e-04 0.0000e+00
## 723 0.0000e+00 0.00000000 2.4403e-04 3.0394e-04 3.3184e-04 0.0000e+00
## 724 0.0000e+00 0.00000000 0.0000e+00 4.5011e-04 4.2441e-04 0.0000e+00
## 725 7.0255e-04 0.00000000 6.8379e-04 1.3477e-03 1.5531e-03 7.0388e-04
## 726 2.4830e-03 0.00832240 5.1123e-03 6.6154e-04 9.9310e-04 4.7131e-03
## 727 2.9011e-04 0.00123020 0.0000e+00 1.5459e-03 1.6540e-03 1.2353e-03
## 728 6.1185e-03 0.00665950 1.4159e-03 2.7663e-03 1.9415e-03 7.1286e-03
## 729 0.0000e+00 0.00000000 1.5626e-03 0.0000e+00 0.0000e+00 0.0000e+00
## 730 0.0000e+00 0.00000000 4.3490e-04 4.6428e-04 4.6465e-04 0.0000e+00
## 731 1.4441e-03 0.00220130 0.0000e+00 3.8475e-03 3.3605e-03 0.0000e+00
## 732 5.2250e-04 0.00000000 4.8899e-04 0.0000e+00 0.0000e+00 0.0000e+00
## 733 0.0000e+00 0.00000000 0.0000e+00 1.1958e-03 1.4143e-03 0.0000e+00
## 734 2.1407e-03 0.00171630 1.9462e-03 2.7295e-03 2.7576e-03 2.1543e-03
## 735 0.0000e+00 0.00000000 0.0000e+00 4.1060e-04 3.5863e-04 0.0000e+00
## 736 2.3903e-03 0.00163960 1.2527e-03 4.1076e-03 4.9712e-03 2.6567e-03
## 737 3.6194e-03 0.00362490 8.1296e-03 3.3313e-03 1.8185e-03 4.8420e-03
## 738 0.0000e+00 0.00000000 1.9033e-04 0.0000e+00 0.0000e+00 3.1838e-04
## 739 1.0621e-03 0.00000000 1.3393e-03 1.8468e-03 2.4716e-03 1.1902e-03
## 740 0.0000e+00 0.00000000 5.5211e-04 8.8411e-04 1.1798e-03 5.7721e-04
## 741 0.0000e+00 0.00000000 8.5861e-04 5.0923e-04 3.8918e-04 0.0000e+00
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## 744 1.1232e-03 0.00280160 6.0067e-04 4.0185e-03 5.1341e-03 4.0191e-03
## 745 9.2837e-04 0.00000000 0.0000e+00 9.8936e-04 1.0127e-03 0.0000e+00
## 746 0.0000e+00 0.00000000 0.0000e+00 2.0074e-04 4.3833e-04 0.0000e+00
## 747 0.0000e+00 0.00000000 1.1327e-03 0.0000e+00 0.0000e+00 1.1196e-03
## 748 5.2408e-03 0.00562100 9.2600e-03 3.8537e-03 2.1342e-03 4.2662e-03
## 749 3.3862e-03 0.00236000 3.4300e-03 7.4297e-04 1.7382e-04 4.0537e-03
## 750 0.0000e+00 0.00000000 4.9479e-04 0.0000e+00 5.7670e-04 0.0000e+00
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## 751 0.0000e+00 0.00000000 1.5100e-03 2.9851e-03 2.0858e-03 0.0000e+00
## 752 2.1911e-03 0.00186310 1.1185e-03 4.0333e-03 5.1566e-03 2.9312e-03
## 753 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 0.0000e+00 1.5025e-03
## 754 0.0000e+00 0.00000000 0.0000e+00 7.1643e-04 9.1255e-04 0.0000e+00
## 755 0.0000e+00 0.00000000 5.9103e-04 8.7133e-04 9.5129e-04 0.0000e+00
## 756 1.3406e-02 0.00999070 1.2852e-02 3.4845e-03 2.7582e-03 1.5356e-02
## 757 0.0000e+00 0.00000000 2.6937e-04 0.0000e+00 0.0000e+00 1.8023e-03
## 758 0.0000e+00 0.00000000 1.1893e-03 6.9255e-04 7.5611e-04 2.5320e-03
## 759 0.0000e+00 0.00000000 3.5066e-04 0.0000e+00 0.0000e+00 5.1325e-04
## 760 2.8643e-02 0.04012600 3.8042e-02 5.8540e-03 6.1630e-03 3.5994e-02
## 761 0.0000e+00 0.00000000 0.0000e+00 1.5950e-03 1.3748e-03 0.0000e+00
## 762 1.1451e-03 0.00071407 3.6866e-03 2.3797e-03 2.8646e-03 2.5814e-03
## 763 0.0000e+00 0.00000000 1.1263e-03 4.1681e-04 1.4002e-04 8.6661e-04
## 764 0.0000e+00 0.00111790 0.0000e+00 1.9787e-03 2.6818e-03 5.6128e-04
## 765 0.0000e+00 0.00000000 1.9200e-03 3.7267e-04 1.0172e-03 1.5328e-03
## 766 4.9607e-04 0.00008249 2.5503e-03 1.9384e-03 1.4814e-03 1.1183e-03
## 767 0.0000e+00 0.00000000 0.0000e+00 6.2020e-04 6.7712e-04 0.0000e+00
## 768 1.5069e-03 0.00070475 2.1859e-03 1.8568e-03 2.1368e-03 2.1231e-03
## 769 0.0000e+00 0.00000000 0.0000e+00 7.9851e-04 8.0473e-04 5.4137e-04
## 770 9.6275e-04 0.00000000 0.0000e+00 2.2230e-03 2.8938e-03 0.0000e+00
## 771 0.0000e+00 0.00000000 1.7873e-03 0.0000e+00 0.0000e+00 1.9931e-03
## 772 1.4821e-03 0.00156410 2.2193e-03 1.2150e-03 1.7245e-03 2.4273e-03
## 773 4.4183e-04 0.00064286 1.1026e-04 1.0202e-03 1.4994e-03 5.5333e-04
## 774 0.0000e+00 0.00000000 0.0000e+00 2.3973e-04 1.7449e-04 1.8781e-04
## 775 0.0000e+00 0.00000000 0.0000e+00 8.3106e-04 0.0000e+00 0.0000e+00
## 776 0.0000e+00 0.00000000 3.1056e-03 1.5718e-03 1.2870e-03 9.8125e-04
## 777 0.0000e+00 0.00000000 0.0000e+00 1.1723e-03 1.8187e-03 4.7128e-04
## 778 2.4414e-03 0.00107470 0.0000e+00 3.0610e-03 5.0965e-03 0.0000e+00
## 779 0.0000e+00 0.00000000 1.8274e-04 1.8208e-03 1.9169e-03 0.0000e+00
## 780 0.0000e+00 0.00000000 0.0000e+00 6.3627e-04 6.4123e-04 3.4510e-04
## 781 0.0000e+00 0.00000000 7.4140e-04 1.5830e-03 1.6562e-03 2.0153e-03
## 782 6.9265e-02 0.06286100 5.7792e-02 7.4323e-03 4.9793e-03 6.0543e-02
## 783 2.3896e-03 0.00247140 3.9709e-03 1.6770e-03 1.1528e-03 2.1533e-03
## 784 0.0000e+00 0.00000000 0.0000e+00 9.4547e-04 8.7740e-04 0.0000e+00
## 785 0.0000e+00 0.00000000 1.8467e-03 0.0000e+00 0.0000e+00 9.5050e-04
## 786 4.3688e-03 0.00000000 3.1073e-03 0.0000e+00 0.0000e+00 2.1885e-03
## 787 0.0000e+00 0.00000000 2.8235e-03 1.9377e-03 1.8021e-03 1.6024e-03
## 788 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00 3.2261e-04 0.0000e+00
## 789 0.0000e+00 0.00000000 1.2581e-03 3.6377e-04 2.7495e-04 6.5767e-04
## 790 0.0000e+00 0.00000000 1.9904e-03 0.0000e+00 0.0000e+00 1.9422e-03
## 791 0.0000e+00 0.00000000 3.0500e-03 7.2356e-04 0.0000e+00 2.5509e-03
## 792 0.0000e+00 0.00000000 1.3113e-03 0.0000e+00 0.0000e+00 4.6177e-04
##      S3_F3      S3_F4      S3_F5      S3_qEV
## 1  1.0247e-03 0.00000000 0.0000e+00 5.7997e-04
## 2  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 3  1.3982e-03 0.00221610 8.4510e-05 6.5494e-04
## 4  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 5  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 6  0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 7  0.0000e+00 0.00000000 1.9945e-04 0.0000e+00
## 8  0.0000e+00 0.00000000 3.6609e-04 0.0000e+00
## 9  0.0000e+00 0.00000000 2.0290e-04 0.0000e+00
## 10 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 11 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 12 1.6217e-04 0.00000000 0.0000e+00 0.0000e+00
## 13 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 14 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 15 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 16 2.8631e-04 0.00000000 0.0000e+00 2.7780e-04
## 17 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 18 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 19 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 20 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 21 0.0000e+00 0.00000000 1.2329e-03 0.0000e+00
## 22 2.6870e-03 0.00332510 2.5118e-03 2.0278e-03
## 23 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 24 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 25 3.0256e-03 0.00133720 9.8209e-04 3.7421e-03
## 26 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00

```



```
## 27 1.5278e-03 0.00151930 8.3687e-04 1.0809e-03
## 28 4.0472e-04 0.00000000 0.0000e+00 0.0000e+00
## 29 3.6303e-04 0.00000000 0.0000e+00 6.5752e-04
## 30 8.1690e-04 0.00000000 0.0000e+00 0.0000e+00
## 31 1.7988e-03 0.00102210 0.0000e+00 0.0000e+00
## 32 5.1030e-04 0.00000000 0.0000e+00 0.0000e+00
## 33 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 34 3.2080e-04 0.00000000 0.0000e+00 0.0000e+00
## 35 6.0100e-04 0.00000000 0.0000e+00 2.2678e-04
## 36 6.8075e-05 0.00000000 0.0000e+00 0.0000e+00
## 37 6.9176e-03 0.00978330 5.0233e-03 2.9458e-03
## 38 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 39 0.0000e+00 0.00000000 2.2640e-03 0.0000e+00
## 40 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 41 0.0000e+00 0.00000000 1.1077e-03 9.5383e-04
## 42 0.0000e+00 0.00000000 0.0000e+00 4.5994e-04
## 43 1.6092e-03 0.00000000 0.0000e+00 0.0000e+00
## 44 3.0583e-03 0.00336260 1.0460e-03 2.1954e-03
## 45 3.4792e-03 0.00164750 7.6230e-04 2.7429e-03
## 46 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 47 4.8343e-04 0.00052785 1.5950e-03 9.6571e-04
## 48 3.7183e-04 0.00000000 6.5175e-04 6.3137e-04
## 49 1.2006e-02 0.01121300 7.5442e-03 9.4026e-03
## 50 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 51 1.5180e-03 0.00000000 3.6955e-04 5.7279e-04
## 52 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 53 1.7823e-03 0.00000000 0.0000e+00 2.0176e-03
## 54 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 55 2.2310e-04 0.00000000 0.0000e+00 0.0000e+00
## 56 1.5595e-03 0.00130590 8.6318e-04 2.8802e-03
## 57 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 58 1.7213e-03 0.00091290 0.0000e+00 0.0000e+00
## 59 0.0000e+00 0.00000000 0.0000e+00 7.1232e-04
## 60 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 61 8.2884e-04 0.00066892 1.0738e-03 2.2436e-03
## 62 6.8051e-04 0.00033835 0.0000e+00 0.0000e+00
## 63 4.5129e-02 0.04969200 4.4635e-02 3.6556e-02
## 64 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 65 1.0017e-03 0.00000000 1.4631e-03 1.7008e-03
## 66 1.7278e-02 0.01873200 1.3951e-02 1.6856e-02
## 67 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 68 1.4305e-02 0.01252800 9.7762e-03 9.2106e-03
## 69 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 70 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 71 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 72 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 73 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 74 1.0467e-02 0.01505400 5.8045e-03 1.2049e-02
## 75 1.3118e-03 0.00000000 0.0000e+00 5.5684e-04
## 76 1.9633e-03 0.00173540 2.8677e-04 0.0000e+00
## 77 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 78 3.1317e-02 0.02989600 2.2955e-02 2.3140e-02
## 79 7.7259e-04 0.00156670 5.3371e-03 3.5497e-03
## 80 2.5768e-03 0.00260310 1.9357e-03 3.1947e-03
## 81 1.0651e-03 0.00000000 3.8893e-04 3.0141e-04
## 82 7.9164e-04 0.00000000 0.0000e+00 1.2546e-03
## 83 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 84 0.0000e+00 0.00000000 0.0000e+00 3.7040e-04
## 85 1.6653e-03 0.00000000 0.0000e+00 7.9372e-04
## 86 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 87 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 88 4.0370e-03 0.00000000 9.3107e-04 1.6837e-03
## 89 3.5696e-04 0.00000000 0.0000e+00 0.0000e+00
## 90 0.0000e+00 0.00000000 3.5786e-04 0.0000e+00
## 91 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 92 0.0000e+00 0.00000000 0.0000e+00 5.9337e-04
## 93 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 94 0.0000e+00 0.00000000 3.1746e-04 0.0000e+00
## 95 3.8954e-04 0.00000000 0.0000e+00 5.8794e-04
```

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## 96 0.0000e+00 0.00000000 0.0000e+00 3.5892e-04
## 97 4.2070e-03 0.00185930 1.5977e-03 4.3258e-03
## 98 7.8630e-04 0.00098767 0.0000e+00 6.0901e-04
## 99 7.6237e-03 0.00808640 1.0181e-02 1.2986e-02
## 100 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 101 2.9890e-03 0.00000000 0.0000e+00 0.0000e+00
## 102 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 103 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 105 1.0876e-03 0.00000000 0.0000e+00 1.9270e-03
## 106 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 107 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 108 0.0000e+00 0.00000000 0.0000e+00 5.1445e-04
## 109 6.0182e-04 0.00000000 0.0000e+00 3.7848e-04
## 110 0.0000e+00 0.00000000 0.0000e+00 9.4064e-05
## 111 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 112 6.0409e-03 0.01141300 9.1325e-03 1.0599e-02
## 113 8.8489e-04 0.00000000 0.0000e+00 8.6814e-04
## 114 1.9324e-04 0.00000000 0.0000e+00 0.0000e+00
## 115 1.2864e-03 0.00000000 0.0000e+00 0.0000e+00
## 116 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 120 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 122 1.3485e-02 0.00946570 1.0341e-02 9.7652e-03
## 123 4.7141e-03 0.00551500 8.7489e-03 6.2780e-03
## 124 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 127 6.5269e-04 0.00000000 1.3728e-03 1.6993e-03
## 128 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 129 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 130 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 131 1.5702e-03 0.00141030 4.8831e-04 1.0034e-03
## 132 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 133 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 134 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 135 4.9779e-04 0.00000000 0.0000e+00 4.5080e-04
## 136 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 139 1.6749e-03 0.00173800 2.5528e-03 2.8028e-03
## 140 1.8999e-03 0.00223920 1.2026e-03 9.5588e-04
## 141 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 142 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 143 7.8085e-04 0.00000000 0.0000e+00 1.2627e-03
## 144 8.7097e-04 0.00000000 2.6941e-04 1.4499e-03
## 145 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 146 1.5025e-03 0.00239060 8.7786e-04 1.5874e-03
## 147 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 148 2.6067e-03 0.00000000 0.0000e+00 0.0000e+00
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## 154 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 155 3.0786e-04 0.00000000 0.0000e+00 0.0000e+00
## 156 2.5170e-03 0.00000000 0.0000e+00 1.4246e-03
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## 158 0.0000e+00 0.00000000 0.0000e+00 3.4297e-04
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## 162 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 164 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
```

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## 165 1.1191e-03 0.00000000 0.0000e+00 1.6288e-03
## 166 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 168 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 169 7.8218e-04 0.00000000 0.0000e+00 9.9611e-04
## 170 6.8005e-03 0.00339760 3.6278e-03 3.3470e-03
## 171 5.5715e-03 0.00457300 1.9764e-03 3.5289e-03
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## 175 3.1129e-03 0.00287950 2.2840e-03 3.3599e-03
## 176 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 177 0.0000e+00 0.00000000 0.0000e+00 8.9837e-04
## 178 3.9674e-04 0.00000000 0.0000e+00 5.7742e-04
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## 183 0.0000e+00 0.00000000 0.0000e+00 1.1009e-03
## 184 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 185 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 186 4.1727e-04 0.00000000 9.1425e-05 3.8379e-04
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## 191 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 192 5.3325e-03 0.00440940 2.6131e-03 2.6612e-03
## 193 0.0000e+00 0.00000000 0.0000e+00 8.0523e-04
## 194 8.1803e-03 0.01122900 1.1471e-02 4.2488e-03
## 195 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 196 7.9466e-04 0.00000000 1.6387e-04 1.2170e-03
## 197 2.0451e-03 0.00099898 0.0000e+00 1.7058e-03
## 198 0.0000e+00 0.00000000 6.9567e-04 0.0000e+00
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## 202 0.0000e+00 0.00000000 2.7096e-03 0.0000e+00
## 203 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 204 5.9216e-03 0.00631340 3.2101e-03 6.2195e-03
## 205 1.3527e-03 0.00000000 0.0000e+00 0.0000e+00
## 206 1.8734e-04 0.00000000 0.0000e+00 0.0000e+00
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## 209 1.2639e-03 0.00000000 0.0000e+00 1.1923e-03
## 210 1.5952e-02 0.05336300 2.0002e-01 7.7229e-02
## 211 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 212 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 213 7.5978e-05 0.00000000 0.0000e+00 0.0000e+00
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```

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## 235 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 236 1.2560e-03 0.00000000 0.0000e+00 1.4218e-03
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## 267 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 269 4.2070e-02 0.04613200 2.9682e-02 3.6092e-02
## 270 2.7823e-02 0.04124000 4.2640e-02 3.1172e-02
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## 272 1.9302e-03 0.00000000 0.0000e+00 4.6821e-03
## 273 2.0451e-03 0.00406730 8.9615e-04 5.2088e-03
## 274 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 275 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 276 4.3853e-03 0.00313080 1.4782e-03 8.5919e-04
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## 280 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 282 9.3177e-03 0.00574210 5.4057e-03 4.6796e-03
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## 291 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 302 1.4251e-03 0.00204070 1.5987e-03 1.0970e-03
```

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## 303 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 304 2.5963e-03 0.00442590 2.0587e-03 1.4695e-03
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## 369 2.1865e-03 0.00000000 1.7160e-04 1.8471e-04
## 370 2.4465e-03 0.00000000 0.0000e+00 5.1926e-04
## 371 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
```

```
## 372 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 373 1.5224e-03 0.00000000 0.0000e+00 1.0340e-03
## 374 1.2694e-03 0.00000000 0.0000e+00 0.0000e+00
## 375 7.6439e-03 0.01146800 5.8177e-03 7.9698e-03
## 376 5.0437e-03 0.00179660 2.6390e-04 7.2433e-03
## 377 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 378 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 379 1.0923e-03 0.00000000 1.6593e-03 8.2434e-04
## 380 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 381 2.0623e-03 0.00000000 0.0000e+00 1.7509e-03
## 382 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 383 6.9355e-04 0.00000000 0.0000e+00 4.8314e-04
## 384 1.9698e-03 0.00000000 1.7264e-03 3.7164e-03
## 385 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 386 2.2940e-03 0.00137730 0.0000e+00 2.0578e-03
## 387 2.0666e-03 0.00082202 0.0000e+00 5.2636e-04
## 388 1.2270e-03 0.00000000 0.0000e+00 1.4662e-03
## 389 2.8817e-03 0.00000000 2.6070e-03 2.9464e-03
## 390 6.6892e-04 0.00000000 2.9312e-04 1.8930e-04
## 391 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 392 1.8379e-03 0.00000000 0.0000e+00 2.2028e-03
## 393 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 394 2.4271e-03 0.00000000 0.0000e+00 1.2211e-03
## 395 1.1362e-03 0.00000000 1.4604e-03 9.4316e-04
## 396 1.4635e-03 0.00000000 0.0000e+00 0.0000e+00
## 397 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 398 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 399 2.4541e-02 0.03404800 5.0724e-02 2.3291e-02
## 400 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 401 7.2637e-04 0.00000000 0.0000e+00 4.1113e-04
## 402 5.3350e-03 0.02263500 1.4214e-02 8.2133e-03
## 403 4.7807e-04 0.00000000 0.0000e+00 7.2157e-04
## 404 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 405 4.1524e-04 0.00000000 0.0000e+00 3.7604e-04
## 406 1.6906e-02 0.02217400 1.2586e-02 1.9446e-02
## 407 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 408 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 409 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 410 2.0681e-04 0.00000000 0.0000e+00 0.0000e+00
## 411 1.4984e-03 0.00204040 2.2005e-03 1.8795e-03
## 412 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 413 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 414 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 415 1.0399e-03 0.00000000 0.0000e+00 2.8840e-03
## 416 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 417 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 418 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 419 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 420 2.3152e-03 0.00000000 4.5991e-03 6.6393e-03
## 421 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 422 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 423 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 424 0.0000e+00 0.00000000 0.0000e+00 9.8862e-04
## 425 1.9633e-04 0.00000000 0.0000e+00 0.0000e+00
## 426 4.5446e-04 0.00000000 0.0000e+00 7.2023e-04
## 427 1.2660e-03 0.00000000 0.0000e+00 1.1024e-03
## 428 8.5858e-04 0.00000000 0.0000e+00 8.9091e-04
## 429 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 430 4.6921e-02 0.03397100 2.1372e-02 1.1531e-02
## 431 5.1847e-04 0.00000000 0.0000e+00 9.7818e-04
## 432 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 433 0.0000e+00 0.00000000 0.0000e+00 1.1112e-03
## 434 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 435 3.3465e-03 0.00788810 6.5175e-03 3.3673e-03
## 436 2.1035e-03 0.00000000 0.0000e+00 1.0990e-03
## 437 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 438 0.0000e+00 0.00000000 2.6070e-03 1.8520e-03
## 439 4.8047e-04 0.00000000 0.0000e+00 1.0459e-03
## 440 1.1277e-03 0.00056960 1.7884e-03 9.1183e-04
```

##	441	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	442	3.4262e-03	0.00211290	0.0000e+00	2.7961e-03
##	443	0.0000e+00	0.00000000	0.0000e+00	6.1461e-04
##	444	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	445	0.0000e+00	0.00000000	0.0000e+00	3.0491e-04
##	446	7.4528e-04	0.00000000	0.0000e+00	1.8078e-04
##	447	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	448	3.2185e-03	0.00426730	0.0000e+00	2.7325e-03
##	449	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	450	2.3182e-03	0.00000000	8.4069e-04	1.6288e-03
##	451	1.9898e-03	0.00000000	0.0000e+00	3.0033e-03
##	452	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	453	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	454	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	455	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	456	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	457	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	458	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	459	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	460	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	461	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	462	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	463	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	464	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	465	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	466	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	467	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	468	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	469	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	470	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	471	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	472	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	473	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	474	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	475	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	476	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	477	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	478	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	479	2.0975e-04	0.00000000	0.0000e+00	0.0000e+00
##	480	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	481	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	482	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	483	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	484	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	485	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	486	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	487	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	488	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	489	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	490	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	491	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	492	0.0000e+00	0.00000000	0.0000e+00	0.0000e+00
##	493	0.0000e+00	0.000		


```
## 579 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 580 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 581 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 582 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 583 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 584 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 585 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 586 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 587 0.0000e+00 0.00000000 0.0000e+00 1.6991e-04
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## 591 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 592 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 593 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 595 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 596 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 597 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 599 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 600 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 601 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 602 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 603 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 605 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 606 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 608 1.0988e-03 0.00291390 0.0000e+00 0.0000e+00
## 609 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 610 1.9374e-03 0.00856270 0.0000e+00 1.4621e-03
## 611 1.2521e-03 0.00000000 0.0000e+00 2.3623e-03
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## 613 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 614 4.6948e-04 0.00000000 0.0000e+00 1.6910e-03
## 615 0.0000e+00 0.00000000 2.0910e-03 1.1575e-03
## 616 1.8314e-03 0.00113320 6.4202e-04 5.3902e-03
## 617 1.1625e-03 0.00000000 0.0000e+00 1.0235e-03
## 618 1.9248e-03 0.00331760 1.3495e-03 2.9414e-03
## 619 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 620 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 621 7.5195e-04 0.00000000 0.0000e+00 4.6430e-04
## 622 0.0000e+00 0.00000000 1.5670e-04 6.0722e-04
## 623 4.0044e-04 0.00000000 0.0000e+00 0.0000e+00
## 624 3.6090e-03 0.00526360 6.9584e-03 1.0009e-02
## 625 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 626 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 627 4.9512e-03 0.00428140 7.3579e-03 7.9198e-03
## 628 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 629 0.0000e+00 0.00000000 5.6229e-04 6.0524e-04
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## 632 5.0340e-04 0.00000000 0.0000e+00 0.0000e+00
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## 634 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 635 0.0000e+00 0.00000000 0.0000e+00 1.0065e-03
## 636 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 637 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 638 2.3458e-03 0.00095701 2.3722e-03 2.2469e-03
## 639 1.2270e-02 0.02075700 2.8553e-02 1.5447e-02
## 640 3.2941e-04 0.00000000 0.0000e+00 0.0000e+00
## 641 1.9591e-02 0.01145100 6.0923e-03 1.6334e-02
## 642 7.9531e-04 0.00000000 0.0000e+00 0.0000e+00
## 643 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 644 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 645 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 646 5.9273e-03 0.00468770 2.7340e-03 4.5908e-03
## 647 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
```

```
## 648 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 649 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 650 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 651 2.3500e-04 0.00000000 0.0000e+00 0.0000e+00
## 652 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 654 0.0000e+00 0.00000000 2.5566e-04 0.0000e+00
## 655 0.0000e+00 0.00000000 0.0000e+00 3.4403e-04
## 656 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 657 3.4539e-03 0.00337430 7.1161e-03 4.5958e-03
## 658 2.1177e-03 0.00198200 0.0000e+00 2.1153e-03
## 659 5.3036e-04 0.00000000 0.0000e+00 9.2783e-04
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## 663 3.2772e-03 0.00404200 2.1374e-03 2.0274e-03
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## 665 7.5780e-04 0.00108200 0.0000e+00 1.1218e-03
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## 671 2.9095e-03 0.00184500 0.0000e+00 3.4367e-03
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## 673 5.9216e-03 0.00663720 4.7081e-03 2.9024e-03
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## 676 3.0003e-03 0.00000000 0.0000e+00 3.1351e-03
## 677 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 679 0.0000e+00 0.00000000 1.5699e-03 0.0000e+00
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## 683 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 688 1.5773e-03 0.00000000 0.0000e+00 9.4527e-04
## 689 0.0000e+00 0.00000000 2.0195e-03 0.0000e+00
## 690 4.6453e-03 0.00581040 2.1508e-03 5.9529e-03
## 691 2.0240e-03 0.00000000 5.5432e-04 2.9355e-03
## 692 5.5775e-04 0.00000000 0.0000e+00 0.0000e+00
## 693 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 694 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 695 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 696 0.0000e+00 0.00000000 1.4664e-03 1.1049e-03
## 697 3.1496e-03 0.00000000 0.0000e+00 2.2284e-03
## 698 1.1737e-03 0.00075451 0.0000e+00 1.2481e-03
## 699 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 700 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 701 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 702 7.6042e-03 0.02474700 7.2702e-03 7.8254e-03
## 703 5.8092e-03 0.00282940 6.8575e-03 3.2209e-03
## 704 2.1745e-03 0.00070608 5.7561e-03 3.7677e-03
## 705 1.3493e-03 0.00000000 3.5477e-03 4.2005e-03
## 706 0.0000e+00 0.00000000 0.0000e+00 1.2292e-03
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## 708 4.8869e-03 0.00281720 6.8899e-03 5.4118e-03
## 709 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 710 3.5979e-03 0.00313280 3.2944e-03 3.4042e-03
## 711 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 712 5.0265e-03 0.00548840 5.1826e-03 8.7023e-03
## 713 3.4871e-03 0.00209360 4.2669e-03 3.2026e-03
## 714 2.7437e-03 0.00000000 0.0000e+00 1.5529e-03
## 715 4.6713e-03 0.00471060 1.8452e-03 4.0963e-03
## 716 0.0000e+00 0.00000000 0.0000e+00 7.7168e-04
```

```
## 717 8.5679e-04 0.00000000 6.4362e-04 2.1476e-03
## 718 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 719 1.1248e-03 0.00000000 0.0000e+00 4.6301e-04
## 720 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 721 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 722 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 723 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 724 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 725 7.2960e-04 0.00052765 0.0000e+00 6.0066e-04
## 726 2.0512e-03 0.00446790 3.4669e-03 3.4829e-03
## 727 0.0000e+00 0.00000000 4.8008e-04 3.1005e-04
## 728 8.1220e-03 0.00919060 4.5409e-03 1.5059e-03
## 729 0.0000e+00 0.00000000 0.0000e+00 1.0139e-03
## 730 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 731 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 732 0.0000e+00 0.00196210 0.0000e+00 0.0000e+00
## 733 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 734 2.6706e-03 0.00248820 1.5182e-03 1.2256e-03
## 735 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 736 1.7489e-03 0.00000000 1.2855e-03 1.0857e-03
## 737 5.9540e-03 0.00837480 4.2652e-03 8.2638e-03
## 738 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 739 1.2139e-03 0.00000000 1.1101e-03 1.0754e-03
## 740 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 741 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 742 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 743 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
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## 747 1.5582e-03 0.00000000 0.0000e+00 1.0289e-03
## 748 5.8384e-03 0.00813460 5.3769e-03 8.0653e-03
## 749 5.4536e-03 0.00374000 1.3185e-03 4.3640e-03
## 750 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 751 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 752 9.4027e-04 0.00000000 2.1425e-03 1.7030e-03
## 753 7.5511e-04 0.00000000 0.0000e+00 0.0000e+00
## 754 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 755 0.0000e+00 0.00000000 5.5985e-04 3.6157e-04
## 756 2.3769e-02 0.01596200 6.7634e-03 2.2713e-02
## 757 0.0000e+00 0.00000000 0.0000e+00 4.8063e-04
## 758 1.7724e-03 0.00000000 0.0000e+00 0.0000e+00
## 759 4.4218e-04 0.00000000 0.0000e+00 0.0000e+00
## 760 2.8523e-02 0.03388900 5.2430e-02 2.4321e-02
## 761 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 762 3.1352e-03 0.00000000 0.0000e+00 2.2028e-03
## 763 7.3850e-04 0.00000000 0.0000e+00 9.6459e-04
## 764 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 765 2.4211e-03 0.00000000 0.0000e+00 2.2424e-03
## 766 1.4050e-03 0.00000000 4.9254e-04 2.1913e-03
## 767 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 768 1.1559e-03 0.00094314 1.2468e-03 1.5098e-03
## 769 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 770 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 771 2.2538e-03 0.00000000 0.0000e+00 1.7008e-03
## 772 2.9062e-03 0.00000000 2.4526e-03 2.0713e-03
## 773 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 774 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 775 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 776 8.7025e-04 0.00000000 0.0000e+00 1.5762e-03
## 777 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 778 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 779 0.0000e+00 0.00000000 0.0000e+00 6.5212e-04
## 780 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 781 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 782 5.8958e-02 0.09761500 5.3507e-02 5.2342e-02
## 783 2.8613e-03 0.00437740 2.3147e-03 4.2979e-03
## 784 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 785 1.4330e-03 0.00000000 0.0000e+00 2.0278e-03
```

```

## 786 4.5370e-03 0.00437490 0.0000e+00 5.6028e-03
## 787 1.5259e-03 0.00236030 0.0000e+00 1.2955e-03
## 788 0.0000e+00 0.00000000 0.0000e+00 0.0000e+00
## 789 7.4367e-04 0.00000000 0.0000e+00 1.0663e-03
## 790 1.0458e-03 0.00000000 0.0000e+00 1.7363e-03
## 791 2.9303e-03 0.00000000 0.0000e+00 2.9024e-03
## 792 0.0000e+00 0.00000000 0.0000e+00 8.8661e-04

heatmap(as.matrix(df[, -1]), xlab = "Sample", ylab = "Protein")

str(df)

## 'data.frame': 792 obs. of 22 variables:
## $ Alternate.ID: chr "guaB1" "alr" "glxB" "Rv2226" ...
## $ S1_100R : num 0.00122 0.000541 0.00026 0.001464 0.001998 ...
## $ S1_F1 : num 0.001019 0.0005 0.000173 0.001427 0.002055 ...
## $ S1_F2 : num 0.001695 0.000807 0.000379 0.002537 0.001775 ...
## $ S1_F3 : num 0.002173 0.000635 0.000508 0.003143 0.002823 ...
## $ S1_F4 : num 0.00119 0.000537 0.000254 0.00303 0.002205 ...
## $ S1_F5 : num 0.000254 0 0.000199 0.001718 0 ...
## $ S1_qEV : num 0.00138 0.000642 0.000307 0.002793 0.002345 ...
## $ S2_100R : num 0.00198 0.000332 0.001049 0 0 ...
## $ S2_F1 : num 0.002367 0.000414 0.00119 0 0 ...
## $ S2_F2 : num 0.001766 0.000496 0.000899 0 0 ...
## $ S2_F3 : num 0.002471 0.000481 0.001672 0 0 ...
## $ S2_F4 : num 0.00179 0 0.00162 0 0 ...
## $ S2_F5 : num 0.000406 0 0.001401 0 0 ...
## $ S2_qEV : num 0.002357 0.000655 0.000981 0 0 ...
## $ S3_100R : num 0.000521 0 0.000898 0.000108 0 ...
## $ S3_F1 : num 0.000253 0 0.001109 0 0 ...
## $ S3_F2 : num 0.000476 0.000211 0.001492 0 0 ...
## $ S3_F3 : num 0.00102 0 0.0014 0 0 ...
## $ S3_F4 : num 0 0 0.00222 0 0 ...
## $ S3_F5 : num 0.00 0.00 8.45e-05 0.00 0.00 ...
## $ S3_qEV : num 0.00058 0 0.000655 0 0 ...

```