BBM713 - Data Mining

2021 Fall Final Project Report

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Contents

Summary

Here we outline our project and explain our motivation in doing this project in one paragraph.

Introduction

Data Source

We collect our own data. Our data collection setup consists of 2 main component: 1) Drone with controller on phone. 2) anemometer. With this setup, we have 2 separate data stream during collection.

We have DJI Tello Drone which is small and easy to use. Drone have various sensors and can be also used programatically. We tried to move Drone programatically, however since it is not stable enough, we decided to move it manually. Available data to collect with Drone are pitch, roll, yaw, speeds of axis x/y/z, temperature, height, pressure, time, acceleration of axis x/y/z. Drone movement pipeline during data collection is given below:

1. Take off of the Drone
2. Moving te Drone forward approximately 10 meters
3. Bringing the Drone back in the same way

4. Going step 2 if there is enough charge else landing of the Drone

Another component of the setup is collecting wind speed data with an anemometer. We bought an anemometre and a tripod to collect wind data. We combine 2 data source by synchronizing time steps. However we have a challenging issue: different frequencies of each stream. Drone has !!! fps, but frequency of anemometer is 1 sample per second. We explain how to handle this issue in pre-processing section.

Step 1: Introducing Drone Data

```
library(tidyr)
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(tibble)

set.seed(1024)


data_drone_path = "/home/emre/workspace/master/cmp713/project/data_final/data_drone.csv"
df_drone = as_tibble(read.csv(data_drone_path, header = TRUE))
head(df_drone, 10)
```

```
## # A tibble: 10 x 14
##       timestamp pitch  roll   yaw   vgx   vgy   vgz templ     h   bat  baro   agx
##           <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1 1636886710.     0     0    58     0     0     0    69     0    90  969.   -14
##  2 1636886710.     0     0    58     0     0     0    69     0    90  969    -14
##  3 1636886710.     0     0    58     0     0     0    69     0    90  969    -13
##  4 1636886711.     0     0    58     0     0     0    69     0    90  969.   -14
##  5 1636886711.     0     0    58     0     0     0    69     0    90  969.   -13
##  6 1636886711.     0     0    58     0     0     0    69     0    90  969.   -12
##  7 1636886711.     0     0    58     0     0     0    69     0    90  969.   -14
##  8 1636886711.     0     0    58     0     0     0    69     0    90  969.   -13
##  9 1636886711.     0     0    58     0     0     0    69     0    90  969.   -13
## 10 1636886711.     0     0    58     0     0     0    69     0    90  969.   -13
## # ... with 2 more variables: agy <dbl>, agz <dbl>
```

```
for(i in df_drone %>% names()) {        # for-loop over columns
  if (i == "timestamp"){
    next
  }

  cat("$", i, "\n", sep = "")
  print(summary(df_drone[[i]]))
  cat("\n")
}
```

```
## $pitch
##      Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -80.0000   0.0000   0.0000  -0.3796   1.0000   8.0000
##
## $roll
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -171.00    0.00    0.00  -18.02    9.00   83.00
##
## $yaw
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -171.0   -10.0     0.0   -41.1     0.0    82.0
##
## $vgx
##      Min.   1st Qu.   Median     Mean   3rd Qu.      Max.
## -11.00000   0.00000   0.00000  0.06908   0.00000  25.00000
##
## $vgy
##      Min.   1st Qu.   Median     Mean   3rd Qu.      Max.
## -10.00000   0.00000   0.00000  0.01799   0.00000  10.00000
##
## $vgz
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   -13.0     0.0     3.0    34.3    71.0    81.0
##
## $templ
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   57.00   60.00   64.00   66.55   73.00   84.00
##
## $h
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -50.00   26.00   68.00   88.81  150.00  180.00
##
## $bat
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    10.0    37.0    90.0   496.5   968.0   970.6
##
## $baro
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    59.0   137.0   959.4   572.9   967.6   970.3
##
## $agx
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -772.00  -29.00   -1.00  -11.55   17.00  508.00
##
## $agy
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -1309.0  -998.0   -77.0  -494.2    -3.0   788.0
##
## $agz
##       Min.   1st Qu.    Median       Mean    3rd Qu.       Max.
##      -2396      -999      -941  805700319 1636887639 1636893464
```

Step 2: Introducing Wind Data

```
data_wind_path = "/home/emre/workspace/master/cmp713/project/data_final/data_wind.csv"
df_wind = as_tibble(read.csv(data_wind_path, header = TRUE))
head(df_wind, 10)
```

```
## # A tibble: 10 x 3
##      timestamp Wind.Speed  Temp
##          <dbl>      <dbl> <dbl>
##  1 1636892866        0.8  17.1
##  2 1636892867        0.4  17.1
##  3 1636892868        0.4  17.1
##  4 1636892870        0    17
##  5 1636892871        0    17
##  6 1636892872        0    17
##  7 1636892874        0    17
##  8 1636892875        0    16.9
##  9 1636892877        0    16.9
## 10 1636892878        0    16.9
```

```
for(i in df_wind %>% names()) {        # for-loop over columns
  if (i == "timestamp"){
    next
  }

  cat("$", i, "\n", sep = "")
  print(summary(df_wind[[i]]))
  cat("\n")
}
```

```
## $Wind.Speed
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.0000  0.0000  1.0500  0.8793  1.4000  1.9800
##
## $Temp
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   12.30   12.80   13.50   13.96   15.00   17.10
```

Step 3: Combining 2 Data Source

Since frequencies of 2 stream are not same, when we combine streams, there was None values for some rows. For example if we got 20 Drone samples between 16:10:02- 16:10:03, we got only 1 wind sample. Hence we add combine these data by concating early Drone sample with Drone sample. Wind value of remaining samples of Drone data is set to "-1".

```
df_path = "/home/emre/workspace/master/cmp713/project/data_final/combined.csv"
df = as_tibble(read.csv(df_path, header = TRUE))
head(df, 10)
```

```
## # A tibble: 10 x 15
##      timestamp pitch  roll   yaw   vgx   vgy   vgz templ     h   bat  baro   agx
##          <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1 1636886710.     0     0    58     0     0     0    69     0    90  969.   -14
##  2 1636886710.     0     0    58     0     0     0    69     0    90  969    -14
##  3 1636886710.     0     0    58     0     0     0    69     0    90  969    -13
##  4 1636886711.     0     0    58     0     0     0    69     0    90  969.   -14
```
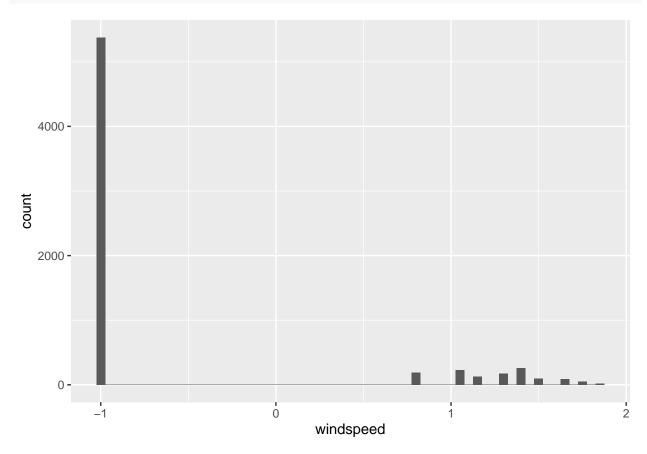
```
##  5 1636886711.     0     0    58     0     0     0    69     0    90  969.    -13
##  6 1636886711.     0     0    58     0     0     0    69     0    90  969.    -12
##  7 1636886711.     0     0    58     0     0     0    69     0    90  969.    -14
##  8 1636886711.     0     0    58     0     0     0    69     0    90  969.    -13
##  9 1636886711.     0     0    58     0     0     0    69     0    90  969.    -13
## 10 1636886711.     0     0    58     0     0     0    69     0    90  969.    -13
## # ... with 3 more variables: agy <dbl>, agz <dbl>, wind.speed <dbl>
```

Step 4: Data Analysis and Relations

Since wind affects behaviour of Drone, we want to show relation between some features.
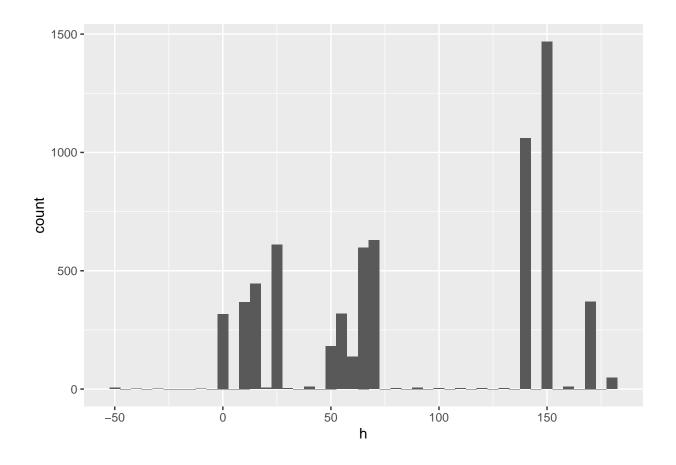
Wind Speed Histogram :

```
library(ggplot2)

p1 <- ggplot(df, aes(x=wind.speed)) + geom_histogram(binwidth = 0.05) + xlab("windspeed")
p1
```
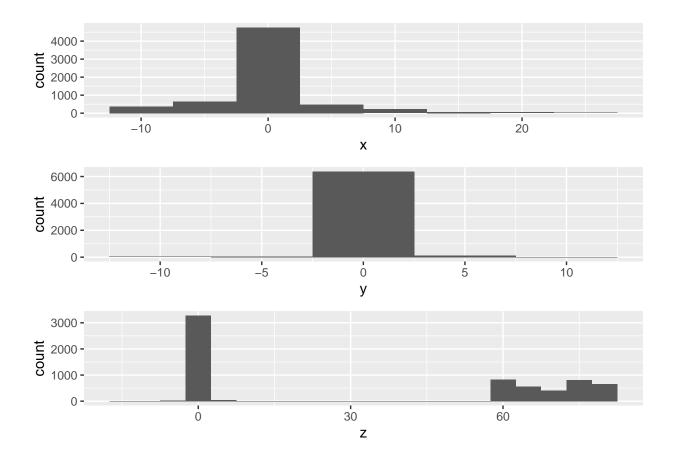

Height Histogram :

```
ggplot(df, aes(x=h)) + geom_histogram(binwidth=5) + xlab("h")
```
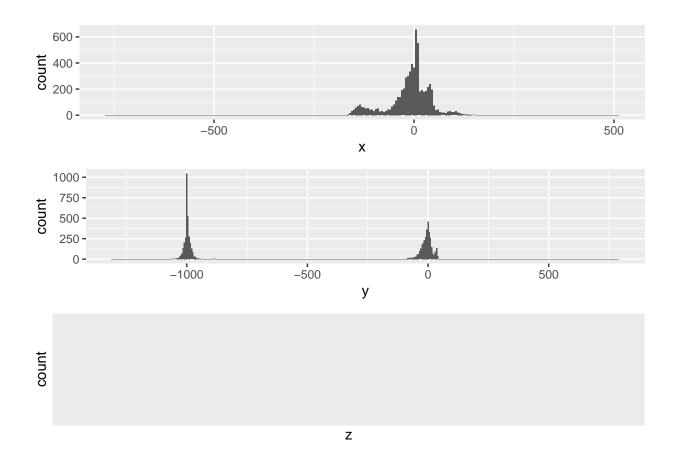
Speed Histograms :

```
library(gridExtra)

##
## Attaching package: 'gridExtra'

## The following object is masked from 'package:dplyr':
##
##     combine

p1 <- ggplot(df, aes(x=vgx)) + geom_histogram(binwidth=5) + xlab("x")
p2 <- ggplot(df, aes(x=vgy)) + geom_histogram(binwidth=5) + xlab("y")
p3 <- ggplot(df, aes(x=vgz)) + geom_histogram(binwidth=5) + xlab("z")

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```
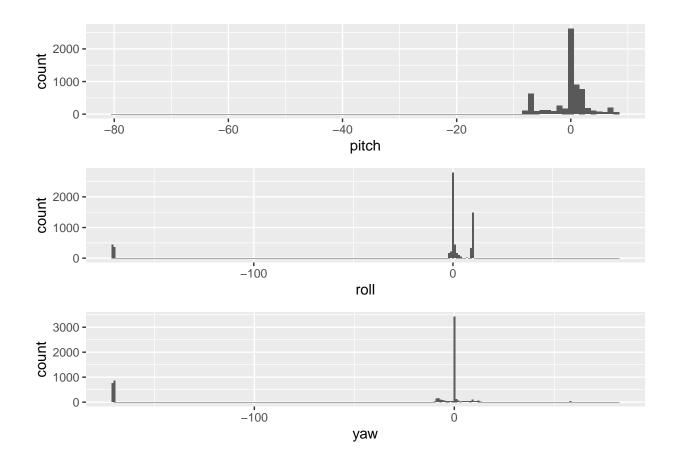
Acceleration Histograms :

```r
p1 <- ggplot(df, aes(x=agx)) + geom_histogram(binwidth=5) + xlab("x")
p2 <- ggplot(df, aes(x=agy)) + geom_histogram(binwidth=5) + xlab("y")
p3 <- ggplot(df, aes(x=agz)) + geom_histogram(binwidth=5) + xlab("z")

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```
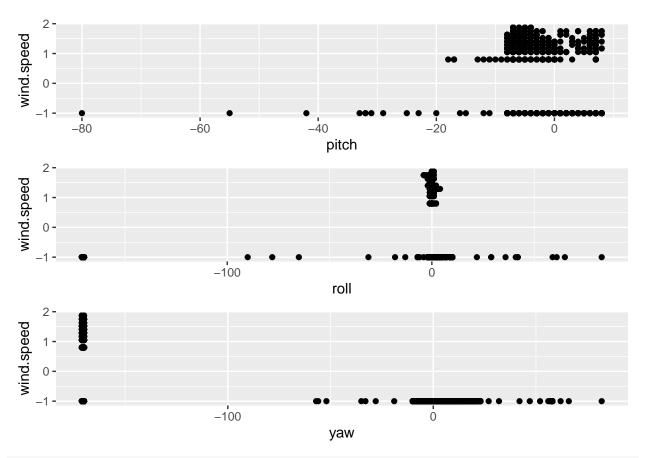
```
## Warning: Computation failed in `stat_bin()`:
## The number of histogram bins must be less than 1,000,000.
## Did you make `binwidth` too small?
```

Pitch/Roll/Yaw Histograms :

```
p1 <- ggplot(df, aes(x=pitch)) + geom_histogram(binwidth=1) + xlab("pitch")
p2 <- ggplot(df, aes(x=roll)) + geom_histogram(binwidth=1) + xlab("roll")
p3 <- ggplot(df, aes(x=yaw)) + geom_histogram(binwidth=1) + xlab("yaw")

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```
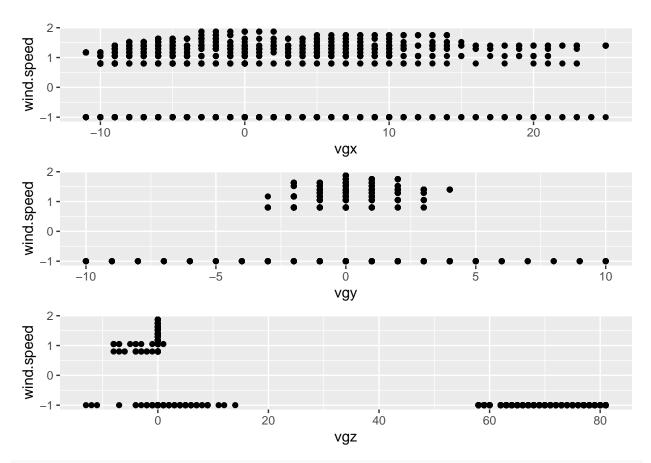
Relation between Wind Speed and pitch/roll/yaw :

```r
p1 <- ggplot(df, aes(x=pitch, y=wind.speed)) + geom_point()
p2 <- ggplot(df, aes(x=roll, y=wind.speed)) + geom_point()
p3 <- ggplot(df, aes(x=yaw, y=wind.speed)) + geom_point()

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```
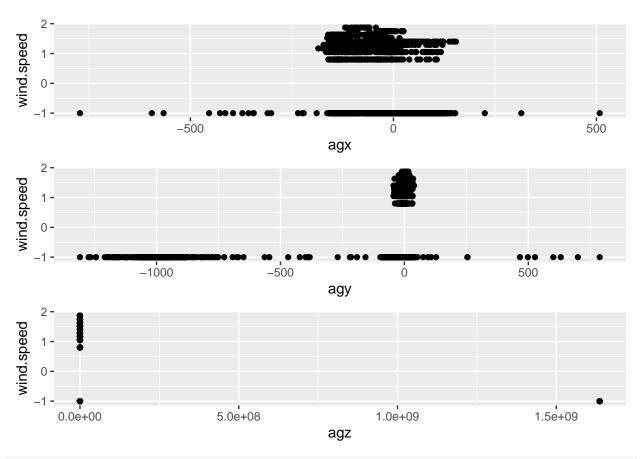
```
# ggplot(df, aes(x=h, y=wind.speed, color=h_group)) + geom_point() + facet_wrap(~ h_group)
```

Relation between Wind Speed and Speeds :

```
p1 <- ggplot(df, aes(x=vgx, y=wind.speed)) + geom_point()
p2 <- ggplot(df, aes(x=vgy, y=wind.speed)) + geom_point()
p3 <- ggplot(df, aes(x=vgz, y=wind.speed)) + geom_point()

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```

```
# ggplot(df, aes(x=h, y=wind.speed, color=h_group)) + geom_point() + facet_wrap(~ h_group)
```

Relation between Wind Speed and Accelerations :

```
p1 <- ggplot(df, aes(x=agx, y=wind.speed)) + geom_point()
p2 <- ggplot(df, aes(x=agy, y=wind.speed)) + geom_point()
p3 <- ggplot(df, aes(x=agz, y=wind.speed)) + geom_point()

grid.arrange(grobs = list(p1, p2, p3),
             labels = c("axis x", "axis y", "axis z"),
             nrow=3)
```

```
# ggplot(df, aes(x=h, y=wind.speed, color=h_group)) + geom_point() + facet_wrap(~ h_group)
```

Related Work

Our primary motivation is ...

Preprocessing

Cleaning

```
library(knitr)
library(tidyr)
library(dplyr)
library(readr)
library(stringr)
library(lubridate)
```

```
##
## Attaching package: 'lubridate'

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

```
# Standardization expect timestamp, date, wind speed
df_mean <- apply(df[2:14], 2, mean)
apply(df[2:14], 2, range)
```

```
##       pitch roll  yaw vgx vgy vgz templ   h   bat   baro  agx   agy          agz
## [1,]   -80 -171 -171 -11 -10 -13    57 -50  10.0  59.00 -772 -1309        -2396
## [2,]     8   83   82  25  10  81    84 180 970.6 970.33  508   788  1636893464
```

```
df_scaled <- cbind(df %>% select(timestamp), df %>% select(-timestamp) %>% select(-wind.speed) %>% scale
df_scaled
```

```
##         timestamp        pitch          roll         yaw         vgx          vgy
## 1      1636886710    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 2      1636886710    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 3      1636886710    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 4      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 5      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 6      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 7      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 8      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 9      1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 10     1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 11     1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 12     1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 13     1636886711    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 14     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 15     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 16     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 17     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 18     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 19     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 20     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 21     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 22     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 23     1636886712    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 24     1636886713    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 25     1636886713    0.1010386   0.3151216984   1.3386642 -0.01544333  -0.01545347
## 26     1636886713    1.4319240   0.0878449340   1.3926944 -0.46252272  -0.01545347
## 27     1636886713   -1.7622009  -0.2268459706   1.1900812 -0.90960211  -3.45157723
## 28     1636886713   -8.4166276   0.1927419021   0.6092567 -1.13314181  -2.59254629
## 29     1636886713   -7.6180964   0.6997439150   0.1094775 -1.13314181  -0.01545347
## 30     1636886713   -5.2225028   0.9445035075  -0.2147036 -0.90960211   0.84357747
## 31     1636886713   -6.5533881   1.0494004757  -0.1471659 -0.46252272   0.84357747
## 32     1636886713   -8.1504506   1.0319176476   0.0824624 -0.01544333  -0.01545347
## 33     1636886713   -8.4166276   1.0494004757   0.2985831 -0.01544333  -0.01545347
## 34     1636886714   -6.0210340   1.3815742082   0.4606737  0.43163606  -0.01545347
## 35     1636886714   -4.1577945   1.3466085522   0.7443322  0.43163606   0.84357747
## 36     1636886714   -0.6974926   0.8221237113   0.8659001 -0.01544333   2.56163936
## 37     1636886714   -0.6974926   0.0004307938   0.7848548 -0.23898303   3.42067030
## 38     1636886714   -3.0930862  -0.8212621237   0.9874680 -0.01544333  -0.87448441
## 39     1636886714  -11.0783984  -1.2583328244   1.4467246  0.20809636  -4.31060817
## 40     1636886714  -21.1931271  -1.0485388881   1.6628454  0.65517575  -2.59254629
## 41     1636886714  -14.5387003   1.7661964249  -0.2011961  0.43163606  -0.87448441
## 42     1636886714   -8.6828047   1.4515055204   0.1770152  0.65517575  -0.87448441
## 43     1636886715   -3.8916174   0.8221237113   0.6362718  1.54933453   1.70260842
## 44     1636886715   -1.2298467   0.3326045264   0.7173171  1.32579484   0.84357747
## 45     1636886715    0.1010386   0.2102247302   0.9199303 -0.01544333  -0.01545347
```

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```
## 46   1636886715  -0.4313155  0.2451903862   1.1225435 -0.01544333 -0.01545347
## 47   1636886715  -0.6974926  0.1927419021   1.2576190 -0.01544333 -0.01545347
## 48   1636886715  -0.4313155  0.1927419021   1.3116491 -0.01544333 -0.01545347
## 49   1636886715  -1.4960238  0.2976388703   1.3251567 -0.01544333 -0.01545347
## 50   1636886715   0.1010386  0.2801560423   1.3251567 -0.01544333 -0.01545347
## 51   1636886715   0.3672157  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 52   1636886715  -0.6974926  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 53   1636886715   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 54   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 55   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 56   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 57   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 58   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 59   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 60   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 61   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 62   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 63   1636886716   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 64   1636886717   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 65   1636886717   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 66   1636886717   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
## 67   1636886717   0.1010386  0.3151216984   1.3386642 -0.01544333 -0.01545347
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## 468  1636887024   1.1657469  0.3326045264  0.5552265   1.77287423 -0.01545347
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## 1287         3   0.1010386   0.4899499787   0.5687341 -0.01544333 -6.88770100
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## 1308    3   0.3672157  0.4899499787  0.5552265 -0.01544333 -6.02867005
## 1309    3   0.6333928  0.4899499787  0.5552265 -0.01544333 -6.88770100
## 1310    3   0.3672157  0.4724671506  0.5552265 -0.01544333 -7.74673194
## 1311    3   0.3672157  0.4899499787  0.5552265 -0.01544333 -7.74673194
## 1312    2   0.3672157  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1313    2   0.6333928  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1314    1   0.6333928  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1315    1   0.6333928  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1316    1   0.3672157  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1317    2   0.1010386  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1318    3   0.3672157  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1319    3   0.6333928  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1320    3   0.8995699  0.4899499787  0.5552265 -0.01544333 -8.60576288
## 1321    2   0.8995699  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1322    3   0.6333928  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1323    4   0.6333928  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1324    5   0.3672157  0.4724671506  0.5552265 -0.01544333 -8.60576288
## 1325    5   0.3672157  0.4899499787  0.5552265 -0.01544333 -6.88770100
## 1326    5   0.6333928  0.4899499787  0.5552265 -0.01544333 -5.16963911
## 1327    5   0.8995699  0.4899499787  0.5552265 -0.01544333 -3.45157723
## 1328    5   0.8995699  0.4899499787  0.5552265 -0.01544333 -1.73351535
## 1329    5   0.3672157  0.4899499787  0.5552265 -0.01544333 -0.87448441
## 1330    4   0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1331    3   0.6333928  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1332    3   0.8995699  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1333    2   0.8995699  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1334    2   0.8995699  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1335    2   1.1657469  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1336    3   0.8995699  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1337    5   0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1338    4   0.6333928  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1339    5   0.6333928  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1340    5   0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 1341    5   0.6333928  0.4724671506  0.5552265 -0.01544333 -0.01545347
```

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## 1342     -2   0.6333928  0.4724671506   0.5687341 -0.01544333 -0.01545347
## 1343    -10   0.3672157  0.4724671506   0.5822416  0.20809636 -0.01545347
## 1344    -14   0.1010386  0.4724671506   0.6227643  0.20809636 -0.01545347
## 1345    -15   0.1010386  0.4899499787   0.6632869  0.43163606 -0.01545347
## 1346     -6   0.1010386  0.4899499787   0.7038095  0.43163606 -0.01545347
## 1347      2   0.1010386  0.4899499787   0.7308246  0.43163606 -0.01545347
## 1348      6   0.3672157  0.4899499787   0.7308246  0.43163606 -0.01545347
## 1349      8   0.3672157  0.4899499787   0.7173171  0.20809636 -0.01545347
## 1350      9   0.6333928  0.4899499787   0.7038095 -0.01544333 -0.01545347
## 1351      9   0.8995699  0.4899499787   0.6903020 -0.01544333 -0.01545347
## 1352      8   1.1657469  0.4899499787   0.6767945 -0.01544333 -0.01545347
## 1353      8   1.1657469  0.4899499787   0.6632869 -0.01544333 -0.01545347
## 1354      7   0.8995699  0.4899499787   0.6497794 -0.01544333 -0.01545347
## 1355      7   0.6333928  0.4899499787   0.6362718  0.20809636 -0.01545347
## 1356      7   0.3672157  0.4899499787   0.6227643  0.20809636 -0.01545347
## 1357      7   0.3672157  0.4724671506   0.6092567  0.20809636 -0.01545347
## 1358      6   0.1010386  0.4724671506   0.6092567  0.20809636 -0.01545347
## 1359     -1   0.1010386  0.4724671506   0.6092567  0.20809636 -0.01545347
## 1360    -10   0.3672157  0.4724671506   0.6227643  0.20809636 -0.01545347
## 1361    -13   0.3672157  0.4724671506   0.6632869  0.20809636 -0.01545347
## 1362     -6   0.3672157  0.4724671506   0.6903020  0.43163606 -0.01545347
## 1363      2   0.3672157  0.4724671506   0.7173171  0.43163606 -0.01545347
## 1364      6   0.3672157  0.4899499787   0.7038095  0.43163606 -0.01545347
## 1365      8   0.3672157  0.4724671506   0.7038095  0.43163606 -0.01545347
## 1366      8   0.1010386  0.4724671506   0.6903020  0.20809636 -0.01545347
## 1367      8   0.3672157  0.4899499787   0.6632869 -0.01544333 -0.01545347
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## 1369      7   0.6333928  0.4899499787   0.6362718 -0.01544333 -0.01545347
## 1370      1   0.6333928  0.4899499787   0.6362718 -0.01544333 -0.01545347
## 1371     -7   0.6333928  0.4724671506   0.6362718 -0.01544333 -0.01545347
## 1372     -8   0.6333928  0.4724671506   0.6632869 -0.01544333 -0.01545347
## 1373     -8   0.6333928  0.4724671506   0.6903020  0.20809636 -0.01545347
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## 1375     -8   0.3672157  0.4724671506   0.7308246  0.20809636 -0.01545347
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## 1377     -8   0.3672157  0.4724671506   0.7713473  0.43163606 -0.01545347
## 1378     -8   0.3672157  0.4724671506   0.7848548  0.43163606 -0.01545347
## 1379     -8   0.1010386  0.4724671506   0.7983624  0.43163606 -0.01545347
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## 1381     -7   0.3672157  0.4899499787   0.8253775  0.65517575 -0.01545347
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```

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## 1396    8    0.1010386    0.4899499787    0.6092567 -0.01544333 -0.01545347
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## 1405    8    0.1010386    0.4899499787    0.5417190 -0.23898303 -0.01545347
## 1406    8    0.1010386    0.4899499787    0.5417190 -0.23898303 -0.01545347
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## 1409    8    0.1010386    0.4899499787    0.5417190 -0.23898303 -0.01545347
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## 1411    8    0.1010386    0.4724671506    0.5282114 -0.23898303 -0.01545347
## 1412    8    0.1010386    0.4899499787    0.5282114 -0.23898303 -0.01545347
## 1413    8    0.1010386    0.4899499787    0.5282114 -0.23898303 -0.01545347
## 1414    8    0.1010386    0.4899499787    0.5282114 -0.23898303 -0.01545347
## 1415    8    0.3672157    0.4899499787    0.5282114 -0.23898303 -0.01545347
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## 1417    8    0.1010386    0.4899499787    0.5147039 -0.23898303 -0.01545347
## 1418    9    0.1010386    0.4899499787    0.5147039 -0.23898303 -0.01545347
## 1419    9    0.1010386    0.4899499787    0.5147039 -0.23898303 -0.01545347
## 1420    8    0.1010386    0.4899499787    0.5147039 -0.23898303 -0.01545347
## 1421    8    0.1010386    0.4899499787    0.5147039 -0.23898303 -0.01545347
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## 1429    9    0.1010386    0.4899499787    0.4876888 -0.23898303 -0.01545347
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## 1439    9    0.1010386    0.4724671506    0.4606737 -0.23898303 -0.01545347
## 1440    9    0.1010386    0.4724671506    0.4471662 -0.46252272 -0.01545347
## 1441    8    0.1010386    0.4724671506    0.4471662 -0.46252272 -0.01545347
## 1442    8    0.1010386    0.4724671506    0.4471662 -0.46252272 -0.01545347
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## 1444    9    0.1010386    0.4724671506    0.4471662 -0.68606242 -0.01545347
## 1445    9    0.1010386    0.4724671506    0.4471662 -0.68606242 -0.01545347
## 1446    9    0.1010386    0.4899499787    0.4471662 -0.90960211 -0.01545347
## 1447    9    0.1010386    0.4899499787    0.4336586 -0.90960211 -0.01545347
## 1448    8    0.3672157    0.4899499787    0.4336586 -0.90960211 -0.01545347
## 1449    8    0.3672157    0.4899499787    0.4336586 -0.90960211 -0.01545347
```

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## 1451    8  0.6333928  0.4899499787  0.4336586 -0.90960211 -0.01545347
## 1452    8  1.1657469  0.4899499787  0.4336586 -0.90960211 -0.01545347
## 1453    8  0.8995699  0.4899499787  0.4336586 -0.90960211 -0.01545347
## 1454    7  1.1657469  0.4899499787  0.4336586 -0.90960211 -0.01545347
## 1455    6  1.4319240  0.4899499787  0.4336586 -0.68606242 -0.01545347
## 1456    4  1.1657469  0.4899499787  0.4336586 -0.68606242 -0.01545347
## 1457    2  0.8995699  0.4899499787  0.4471662 -0.46252272 -0.01545347
## 1458    3  0.8995699  0.4899499787  0.4606737 -0.46252272 -0.01545347
## 1459    9  0.8995699  0.4899499787  0.4606737 -0.46252272 -0.01545347
## 1460    8  0.3672157  0.4899499787  0.4471662 -0.46252272 -0.01545347
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## 1470    6  1.1657469  0.4899499787  0.4336586 -0.46252272 -0.01545347
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## 1474    2  0.6333928  0.4724671506  0.4741813 -0.23898303 -0.01545347
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## 1477    3  0.6333928  0.4899499787  0.5011963 -0.23898303 -0.01545347
## 1478    3  0.6333928  0.4899499787  0.5147039 -0.23898303 -0.01545347
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## 1483    9  0.1010386  0.4899499787  0.5147039 -0.01544333 -0.01545347
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## 1486    9  0.1010386  0.4724671506  0.5147039 -0.01544333 -0.01545347
## 1487    9  0.1010386  0.4724671506  0.5147039 -0.23898303 -0.01545347
## 1488    9  0.1010386  0.4724671506  0.5147039 -0.23898303 -0.01545347
## 1489    9  0.1010386  0.4724671506  0.5147039 -0.23898303 -0.01545347
## 1490    9  0.1010386  0.4899499787  0.5011963 -0.23898303 -0.01545347
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## 1502    8  0.3672157  0.4899499787  0.4741813 -0.68606242 -0.01545347
## 1503    8  0.3672157  0.4899499787  0.4741813 -0.68606242 -0.01545347
```

```
## 1504    8   0.6333928   0.4899499787   0.4741813  -0.68606242  -0.01545347
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## 1506    7   0.8995699   0.4899499787   0.4741813  -0.68606242  -0.01545347
## 1507    7   0.8995699   0.4899499787   0.4741813  -0.46252272  -0.01545347
## 1508    7   0.8995699   0.4899499787   0.4741813  -0.46252272  -0.01545347
## 1509    2   1.1657469   0.4899499787   0.4741813  -0.46252272  -0.01545347
## 1510   -8   0.8995699   0.4724671506   0.5011963  -0.23898303  -0.01545347
## 1511   -9   0.6333928   0.4724671506   0.5417190  -0.23898303  -0.01545347
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## 1513   -7   0.6333928   0.4724671506   0.5957492  -0.01544333   0.84357747
## 1514   -7   0.8995699   0.4724671506   0.6227643  -0.01544333   0.84357747
## 1515   -5   1.4319240   0.4724671506   0.6632869  -0.01544333  -0.01545347
## 1516   -1   1.6981011   0.4899499787   0.6767945   0.20809636  -0.01545347
## 1517    4   0.8995699   0.4899499787   0.6903020   0.43163606  -0.01545347
## 1518    7   0.6333928   0.4899499787   0.6767945   0.65517575  -0.01545347
## 1519    8   0.6333928   0.4899499787   0.6767945   0.43163606  -0.01545347
## 1520    8   0.3672157   0.4899499787   0.6632869   0.43163606  -0.01545347
## 1521    8   0.3672157   0.4899499787   0.6497794   0.43163606  -0.01545347
## 1522    7   0.3672157   0.4899499787   0.6362718   0.20809636  -0.01545347
## 1523    6   0.6333928   0.4899499787   0.6227643   0.20809636  -0.01545347
## 1524    0   0.6333928   0.4724671506   0.6227643   0.20809636  -0.01545347
## 1525   -8   0.6333928   0.4724671506   0.6362718   0.20809636  -0.01545347
## 1526   -8   0.6333928   0.4724671506   0.6632869   0.43163606  -0.01545347
## 1527   -8   0.6333928   0.4724671506   0.6903020   0.43163606  -0.01545347
## 1528   -7   0.6333928   0.4724671506   0.7038095   0.43163606  -0.01545347
## 1529   -4   1.1657469   0.4724671506   0.7308246   0.43163606  -0.01545347
## 1530    2   0.8995699   0.4899499787   0.7308246   0.65517575  -0.01545347
## 1531    6   0.6333928   0.4899499787   0.7173171   0.65517575  -0.01545347
## 1532    6   0.6333928   0.4899499787   0.7173171   0.65517575  -0.01545347
## 1533    6   0.6333928   0.4899499787   0.7038095   0.43163606  -0.01545347
## 1534    7   0.6333928   0.4899499787   0.6903020   0.43163606  -0.01545347
## 1535    7   0.6333928   0.4899499787   0.6767945   0.43163606  -0.01545347
## 1536    7   0.6333928   0.4899499787   0.6632869   0.20809636  -0.01545347
## 1537    7   0.8995699   0.4899499787   0.6497794   0.20809636  -0.01545347
## 1538    7   0.6333928   0.4899499787   0.6497794   0.20809636  -0.01545347
## 1539    5   0.6333928   0.4899499787   0.6362718   0.20809636  -0.01545347
## 1540   -3   0.6333928   0.4899499787   0.6362718   0.20809636  -0.01545347
## 1541   -8   0.3672157   0.4899499787   0.6497794   0.20809636  -0.01545347
## 1542   -8   0.6333928   0.4899499787   0.6767945   0.20809636  -0.01545347
## 1543   -8   0.6333928   0.4899499787   0.6903020   0.43163606  -0.01545347
## 1544   -6   1.1657469   0.4899499787   0.7038095   0.43163606  -0.01545347
## 1545    0   0.8995699   0.4899499787   0.7173171   0.43163606  -0.01545347
## 1546    4   0.6333928   0.4899499787   0.7173171   0.43163606  -0.01545347
## 1547    5   0.6333928   0.4899499787   0.6903020   0.43163606  -0.01545347
## 1548    5   0.6333928   0.4899499787   0.6767945   0.43163606  -0.01545347
## 1549    5   0.3672157   0.4899499787   0.6632869   0.43163606  -0.01545347
## 1550    5   0.3672157   0.4899499787   0.6632869   0.20809636  -0.01545347
## 1551    5   0.6333928   0.4724671506   0.6497794   0.20809636  -0.01545347
## 1552    0   0.6333928   0.4724671506   0.6362718   0.20809636  -0.01545347
## 1553   -8   0.8995699   0.4724671506   0.6497794   0.20809636  -0.01545347
## 1554   -8   0.8995699   0.4724671506   0.6632869   0.43163606  -0.01545347
## 1555   -8   0.8995699   0.4724671506   0.6903020   0.43163606  -0.01545347
## 1556   -5   1.1657469   0.4724671506   0.7038095   0.65517575  -0.01545347
## 1557    1   0.6333928   0.4724671506   0.7038095   0.65517575  -0.01545347
```

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## 1558    4   0.6333928   0.4724671506   0.6903020   0.65517575 -0.01545347
## 1559    4   0.3672157   0.4724671506   0.6767945   0.65517575 -0.01545347
## 1560    4   0.3672157   0.4899499787   0.6767945   0.43163606 -0.01545347
## 1561    5   0.3672157   0.4899499787   0.6632869   0.43163606 -0.01545347
## 1562    5   0.6333928   0.4899499787   0.6497794   0.20809636 -0.01545347
## 1563    5   0.6333928   0.4899499787   0.6362718   0.20809636 -0.01545347
## 1564    5   0.6333928   0.4899499787   0.6362718   0.20809636 -0.01545347
## 1565    5   0.6333928   0.4899499787   0.6227643   0.20809636 -0.01545347
## 1566    4   0.8995699   0.4899499787   0.6092567 -0.01544333 -0.01545347
## 1567    4   0.8995699   0.4899499787   0.5957492   0.20809636 -0.01545347
## 1568    8   0.6333928   0.4899499787   0.5957492   0.20809636 -0.01545347
## 1569    8   0.1010386   0.4724671506   0.5822416 -0.01544333 -0.01545347
## 1570    8   0.1010386   0.4724671506   0.5687341 -0.01544333 -0.01545347
## 1571    8   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 1572    8   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 1573    8   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 1574    8   0.1010386   0.4899499787   0.5417190 -0.01544333 -0.01545347
## 1575    8   0.1010386   0.4724671506   0.5417190 -0.23898303 -0.01545347
## 1576    8   0.1010386   0.4899499787   0.5282114 -0.23898303 -0.01545347
## 1577    8   0.1010386   0.4899499787   0.5147039 -0.23898303 -0.01545347
## 1578    8   0.1010386   0.4899499787   0.5147039 -0.46252272 -0.01545347
## 1579    8   0.1010386   0.4899499787   0.5011963 -0.46252272 -0.01545347
## 1580    8   0.3672157   0.4899499787   0.5011963 -0.46252272 -0.01545347
## 1581    8   0.3672157   0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1582    8   0.3672157   0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1583    8   0.6333928   0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1584    8   0.6333928   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1585    8   0.3672157   0.4724671506   0.4741813 -0.68606242 -0.01545347
## 1586    8   0.3672157   0.4724671506   0.4741813 -0.68606242 -0.01545347
## 1587    8   0.3672157   0.4724671506   0.4606737 -0.68606242 -0.01545347
## 1588    8   0.3672157   0.4724671506   0.4606737 -0.68606242 -0.01545347
## 1589    8   0.1010386   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1590    8   0.1010386   0.4899499787   0.4471662 -0.68606242 -0.01545347
## 1591    8   0.3672157   0.4899499787   0.4471662 -0.68606242 -0.01545347
## 1592    8   0.6333928   0.4899499787   0.4471662 -0.68606242 -0.01545347
## 1593    8   0.6333928   0.4899499787   0.4471662 -0.68606242 -0.01545347
## 1594    8   0.6333928   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1595    8   0.8995699   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1596    8   0.8995699   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1597    8   0.8995699   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1598    7   1.4319240   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1599    8   0.8995699   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1600    9   0.3672157   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1601    8   0.3672157   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1602    9   0.1010386   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1603    9   0.1010386   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1604    8   0.1010386   0.4724671506   0.4606737 -0.68606242 -0.01545347
## 1605    8   0.3672157   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1606    9   0.1010386   0.4899499787   0.4606737 -0.68606242 -0.01545347
## 1607    9   0.3672157   0.4724671506   0.4606737 -0.68606242 -0.01545347
## 1608    8   0.3672157   0.4724671506   0.4606737 -0.90960211 -0.01545347
## 1609    8   0.3672157   0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1610    8   0.3672157   0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1611    9   0.1010386   0.4899499787   0.4606737 -0.90960211 -0.01545347
```

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## 1612          8    0.3672157  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1613          8    0.6333928  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1614          8    0.6333928  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1615          8    0.8995699  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1616          8    0.6333928  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1617          8    0.3672157  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1618          9    0.3672157  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1619          8    0.6333928  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1620          8    0.8995699  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1621          8    0.8995699  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1622          7    1.1657469  0.4899499787   0.4606737 -0.90960211 -0.01545347
## 1623          7    1.4319240  0.4899499787   0.4741813 -0.68606242 -0.01545347
## 1624          7    1.4319240  0.4899499787   0.4741813 -0.68606242 -0.01545347
## 1625          7    1.4319240  0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1626          6    1.1657469  0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1627          5    0.8995699  0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1628          4    0.8995699  0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1629          4    0.8995699  0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1630          4    0.8995699  0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1631          4    0.8995699  0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1632          4    0.8995699  0.4899499787   0.5147039 -0.23898303 -0.01545347
## 1633          4    0.8995699  0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1634          5    1.1657469  0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1635          5    0.8995699  0.4899499787   0.5417190 -0.01544333 -0.01545347
## 1636          8    0.8995699  0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1637          9    0.3672157  0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1638          9    0.3672157  0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1639          9    0.1010386  0.4724671506   0.5282114 -0.01544333 -0.01545347
## 1640          9    0.1010386  0.4724671506   0.5282114 -0.01544333 -0.01545347
## 1641          9    0.1010386  0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1642          9    0.1010386  0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1643          9   -0.1651384  0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1644          8    0.1010386  0.4899499787   0.5011963 -0.01544333 -0.01545347
## 1645          9    0.1010386  0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1646          8    0.1010386  0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1647          8    0.1010386  0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1648          9    0.1010386  0.4899499787   0.5011963 -0.46252272 -0.01545347
## 1649          8    0.3672157  0.4899499787   0.5011963 -0.46252272 -0.01545347
## 1650          8    0.3672157  0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1651          8    0.3672157  0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1652          8    0.6333928  0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1653          8    0.6333928  0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1654          8    0.6333928  0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1655          4    0.8995699  0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1656         -2    1.6981011  0.4724671506   0.5011963 -0.46252272 -0.01545347
## 1657         -8    0.8995699  0.4724671506   0.5282114 -0.23898303 -0.01545347
## 1658         -8    0.6333928  0.4724671506   0.5552265 -0.01544333 -0.01545347
## 1659         -7    0.3672157  0.4724671506   0.5957492 -0.01544333 -0.01545347
## 1660         -7    0.3672157  0.4724671506   0.6227643 -0.01544333 -0.01545347
## 1661         -7    0.3672157  0.4724671506   0.6497794 -0.01544333 -0.01545347
## 1662         -7    0.3672157  0.4724671506   0.6767945 -0.01544333 -0.01545347
## 1663         -8    0.3672157  0.4724671506   0.7038095 -0.01544333 -0.01545347
## 1664         -7    0.8995699  0.4724671506   0.7173171 -0.01544333 -0.01545347
## 1665         -6    1.4319240  0.4724671506   0.7443322  0.20809636 -0.01545347
```

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```
## 1666     1   1.1657469   0.4724671506   0.7578397   0.43163606 -0.01545347
## 1667     6   0.6333928   0.4724671506   0.7443322   0.43163606 -0.01545347
## 1668     8   0.6333928   0.4724671506   0.7308246   0.43163606 -0.01545347
## 1669     8   0.6333928   0.4899499787   0.7308246   0.20809636 -0.01545347
## 1670     7   0.6333928   0.4899499787   0.7173171   0.20809636 -0.01545347
## 1671     8   0.6333928   0.4899499787   0.7038095   0.20809636 -0.01545347
## 1672     8   0.6333928   0.4899499787   0.6903020   0.20809636 -0.01545347
## 1673     8   0.6333928   0.4899499787   0.6767945   0.20809636 -0.01545347
## 1674     8   0.6333928   0.4899499787   0.6767945   0.20809636 -0.01545347
## 1675     8   0.6333928   0.4899499787   0.6632869   0.20809636 -0.01545347
## 1676     5   0.6333928   0.4899499787   0.6497794   0.20809636 -0.01545347
## 1677    -1   0.8995699   0.4724671506   0.6497794   0.20809636 -0.01545347
## 1678    -8   0.6333928   0.4724671506   0.6632869   0.20809636 -0.01545347
## 1679    -8   0.6333928   0.4724671506   0.6903020   0.43163606 -0.01545347
## 1680    -7   0.3672157   0.4724671506   0.7173171   0.43163606 -0.01545347
## 1681    -7   0.3672157   0.4899499787   0.7308246   0.43163606 -0.01545347
## 1682    -7   0.6333928   0.4899499787   0.7578397   0.43163606 -0.01545347
## 1683    -8   0.6333928   0.4899499787   0.7713473   0.43163606 -0.01545347
## 1684    -7   0.8995699   0.4899499787   0.7848548   0.65517575 -0.01545347
## 1685    -7   0.8995699   0.4899499787   0.7983624   0.65517575 -0.01545347
## 1686    -7   0.8995699   0.4899499787   0.8118699   0.87871545 -0.01545347
## 1687    -8   0.8995699   0.4724671506   0.8253775   0.87871545 -0.01545347
## 1688    -7   0.8995699   0.4899499787   0.8388850   0.87871545 -0.01545347
## 1689    -7   1.1657469   0.4899499787   0.8523926   1.10225514 -0.01545347
## 1690    -3   1.6981011   0.4724671506   0.8659001   1.10225514 -0.01545347
## 1691     4   1.1657469   0.4899499787   0.8523926   1.32579484 -0.01545347
## 1692     8   0.6333928   0.4899499787   0.8253775   1.32579484 -0.01545347
## 1693     8   0.1010386   0.4899499787   0.8118699   1.10225514 -0.01545347
## 1694     8   0.1010386   0.4899499787   0.7848548   1.10225514 -0.01545347
## 1695     8   0.1010386   0.4899499787   0.7713473   0.87871545 -0.01545347
## 1696     8   0.1010386   0.4899499787   0.7443322   0.65517575 -0.01545347
## 1697     8   0.1010386   0.4899499787   0.7308246   0.65517575 -0.01545347
## 1698     8   0.1010386   0.4899499787   0.7038095   0.43163606 -0.01545347
## 1699     8   0.1010386   0.4899499787   0.6903020   0.20809636 -0.01545347
## 1700     8   0.1010386   0.4899499787   0.6767945   0.20809636 -0.01545347
## 1701     8   0.1010386   0.4899499787   0.6497794 -0.01544333 -0.01545347
## 1702     8   0.1010386   0.4899499787   0.6362718 -0.01544333 -0.01545347
## 1703     8   0.1010386   0.4899499787   0.6227643 -0.01544333 -0.01545347
## 1704     8   0.1010386   0.4899499787   0.6092567 -0.01544333 -0.01545347
## 1705     8   0.1010386   0.4899499787   0.6092567 -0.01544333 -0.01545347
## 1706     8   0.1010386   0.4899499787   0.5957492 -0.23898303 -0.01545347
## 1707     8   0.1010386   0.4899499787   0.5822416 -0.23898303 -0.01545347
## 1708     8   0.1010386   0.4899499787   0.5822416 -0.23898303 -0.01545347
## 1709     8   0.1010386   0.4899499787   0.5687341 -0.23898303 -0.01545347
## 1710     8   0.1010386   0.4899499787   0.5687341 -0.46252272 -0.01545347
## 1711     8   0.1010386   0.4899499787   0.5552265 -0.46252272 -0.01545347
## 1712     8   0.1010386   0.4899499787   0.5552265 -0.46252272 -0.01545347
## 1713     8   0.1010386   0.4899499787   0.5552265 -0.46252272 -0.01545347
## 1714     8   0.1010386   0.4899499787   0.5552265 -0.68606242 -0.01545347
## 1715     8   0.1010386   0.4899499787   0.5417190 -0.68606242 -0.01545347
## 1716     8   0.1010386   0.4899499787   0.5417190 -0.68606242 -0.01545347
## 1717     8   0.3672157   0.4899499787   0.5417190 -0.68606242 -0.01545347
## 1718     8   0.3672157   0.4899499787   0.5417190 -0.68606242 -0.01545347
## 1719     8   0.1010386   0.4899499787   0.5282114 -0.68606242 -0.01545347
```

```
## 1720       8   0.1010386   0.4899499787   0.5282114 -0.68606242 -0.01545347
## 1721       8   0.1010386   0.4724671506   0.5282114 -0.68606242 -0.01545347
## 1722       8   0.3672157   0.4724671506   0.5282114 -0.68606242 -0.01545347
## 1723       9   0.1010386   0.4899499787   0.5282114 -0.68606242 -0.01545347
## 1724       8   0.1010386   0.4899499787   0.5147039 -0.90960211 -0.01545347
## 1725       8   0.3672157   0.4899499787   0.5147039 -0.90960211 -0.01545347
## 1726       8   0.3672157   0.4899499787   0.5011963 -0.90960211 -0.01545347
## 1727       8   0.6333928   0.4724671506   0.5011963 -0.90960211 -0.01545347
## 1728       8   0.6333928   0.4899499787   0.5011963 -0.68606242 -0.01545347
## 1729       8   0.3672157   0.4899499787   0.5011963 -0.68606242 -0.01545347
## 1730       8   0.3672157   0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1731       8   0.3672157   0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1732       8   0.6333928   0.4899499787   0.4876888 -0.68606242 -0.01545347
## 1733       8   0.6333928   0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1734       7   0.8995699   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1735       7   1.1657469   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1736       6   1.1657469   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1737       4   0.8995699   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1738       4   0.6333928   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1739       3   0.8995699   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1740       3   0.8995699   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1741       3   1.1657469   0.4724671506   0.5147039 -0.23898303 -0.01545347
## 1742       3   0.8995699   0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1743       3   0.6333928   0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1744       8   0.1010386   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1745       8   0.1010386   0.4724671506   0.5011963 -0.23898303 -0.01545347
## 1746       8   0.1010386   0.4724671506   0.4876888 -0.23898303 -0.01545347
## 1747       8   0.1010386   0.4724671506   0.4876888 -0.23898303 -0.01545347
## 1748       8   0.1010386   0.4724671506   0.4876888 -0.23898303 -0.01545347
## 1749       8   0.1010386   0.4724671506   0.4876888 -0.46252272 -0.01545347
## 1750       8   0.1010386   0.4724671506   0.4741813 -0.46252272 -0.01545347
## 1751       8   0.1010386   0.4724671506   0.4741813 -0.46252272 -0.01545347
## 1752       8   0.3672157   0.4724671506   0.4741813 -0.46252272 -0.01545347
## 1753       8   0.3672157   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1754       8   0.6333928   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1755       8   0.8995699   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1756       8   0.8995699   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1757       7   0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1758       5   0.3672157   0.4724671506   0.4741813 -0.23898303 -0.01545347
## 1759       4   0.3672157   0.4724671506   0.4741813 -0.23898303 -0.01545347
## 1760       8   0.3672157   0.4724671506   0.4876888 -0.23898303 -0.01545347
## 1761       9   0.1010386   0.4724671506   0.4741813 -0.23898303 -0.01545347
## 1762       9   0.1010386   0.4724671506   0.4741813 -0.23898303 -0.01545347
## 1763       9   0.3672157   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1764       8   0.6333928   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1765       8   0.6333928   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1766       8   0.8995699   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1767       7   1.1657469   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1768       4   0.8995699   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1769       4   0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1770       5   0.8995699   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1771       9   0.6333928   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1772       9   0.3672157   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1773       8   0.6333928   0.4899499787   0.4741813 -0.46252272 -0.01545347
```

```
## 1774       8    0.6333928   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1775       8    0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1776       8    0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1777       6    0.6333928   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1778       5    0.6333928   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1779       4    0.6333928   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1780       8    0.6333928   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1781       9    0.1010386   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1782       8    0.1010386   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1783       8    0.1010386   0.4724671506   0.4741813 -0.23898303 -0.01545347
## 1784       9    0.1010386   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1785       8    0.3672157   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1786       8    0.3672157   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1787       8    0.6333928   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1788       7    0.8995699   0.4899499787   0.4471662 -0.23898303 -0.01545347
## 1789       4    0.6333928   0.4899499787   0.4471662 -0.23898303 -0.01545347
## 1790       3    0.6333928   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1791       9    0.3672157   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1792       9    0.1010386   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1793       8    0.3672157   0.4899499787   0.4471662 -0.46252272 -0.01545347
## 1794       8    0.6333928   0.4899499787   0.4471662 -0.46252272 -0.01545347
## 1795       8    0.8995699   0.4899499787   0.4471662 -0.46252272 -0.01545347
## 1796       5    0.8995699   0.4899499787   0.4471662 -0.46252272 -0.01545347
## 1797       3    0.8995699   0.4899499787   0.4471662 -0.46252272 -0.01545347
## 1798       3    0.8995699   0.4899499787   0.4606737 -0.23898303 -0.01545347
## 1799       3    0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1800       3    0.8995699   0.4899499787   0.4741813 -0.23898303 -0.01545347
## 1801       3    0.8995699   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1802       3    0.8995699   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1803       3    0.6333928   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1804       7    0.8995699   0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1805       9    0.3672157   0.4899499787   0.5011963 -0.01544333 -0.01545347
## 1806       8    0.1010386   0.4899499787   0.5011963 -0.23898303 -0.01545347
## 1807       8    0.1010386   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1808       8    0.1010386   0.4899499787   0.4876888 -0.23898303 -0.01545347
## 1809       8    0.1010386   0.4899499787   0.4876888 -0.46252272 -0.01545347
## 1810       8    0.1010386   0.4899499787   0.4741813 -0.46252272 -0.01545347
## 1811       8    0.3672157   0.4899499787   0.4741813 -0.68606242 -0.01545347
## 1812       9    0.6333928   0.4899499787   0.4741813 -0.68606242 -0.01545347
## 1813       8    0.8995699   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1814       8    0.6333928   0.4899499787   0.4606737 -0.46252272 -0.01545347
## 1815       9    0.3672157   0.4724671506   0.4606737 -0.46252272 -0.01545347
## 1816       9    0.3672157   0.4724671506   0.4471662 -0.46252272 -0.01545347
## 1817       9    0.6333928   0.4724671506   0.4471662 -0.23898303  0.84357747
## 1818       9    0.1010386   0.4899499787   0.4336586 -0.23898303 -0.01545347
## 1819       9    0.1010386   0.4899499787   0.4201511 -0.46252272 -0.01545347
## 1820       8    0.3672157   0.4899499787   0.4201511 -0.46252272 -0.01545347
## 1821       3    0.6333928   0.4724671506   0.4201511 -0.46252272 -0.01545347
## 1822       1    0.8995699   0.4724671506   0.4201511 -0.23898303 -0.01545347
## 1823       0    0.6333928   0.4899499787   0.4336586 -0.23898303 -0.01545347
## 1824       0    0.3672157   0.4899499787   0.4336586 -0.23898303 -0.01545347
## 1825      -2    0.1010386   0.4899499787   0.4471662 -0.01544333 -0.01545347
## 1826      -9    0.1010386   0.4899499787   0.4741813 -0.01544333 -0.01545347
## 1827      -8    0.1010386   0.4899499787   0.5011963 -0.01544333 -0.01545347
```

```
## 1828      -8   0.1010386  0.4899499787  0.5282114 -0.01544333 -0.01545347
## 1829      -7   0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 1830      -8   0.1010386  0.4899499787  0.5687341 -0.01544333 -0.01545347
## 1831      -8   0.1010386  0.4899499787  0.5822416 -0.01544333 -0.01545347
## 1832      -8   0.1010386  0.4724671506  0.6092567 -0.01544333 -0.01545347
## 1833      -8   0.3672157  0.4899499787  0.6227643 -0.01544333 -0.01545347
## 1834      -8   0.1010386  0.4724671506  0.6497794  0.20809636 -0.01545347
## 1835      -8   0.1010386  0.4724671506  0.6632869  0.20809636 -0.01545347
## 1836      -8   0.1010386  0.4724671506  0.6767945  0.20809636 -0.01545347
## 1837      -8   0.3672157  0.4724671506  0.7038095  0.20809636 -0.01545347
## 1838      -5   0.6333928  0.4724671506  0.7173171  0.20809636 -0.01545347
## 1839       0   0.6333928  0.4724671506  0.7173171  0.43163606 -0.01545347
## 1840       4   0.3672157  0.4724671506  0.7173171  0.43163606 -0.01545347
## 1841       5   0.3672157  0.4724671506  0.7038095  0.20809636 -0.01545347
## 1842       6   0.3672157  0.4724671506  0.6903020  0.20809636 -0.01545347
## 1843       6   0.3672157  0.4724671506  0.6767945  0.20809636 -0.01545347
## 1844       6   0.3672157  0.4724671506  0.6632869  0.20809636 -0.01545347
## 1845       6   0.6333928  0.4724671506  0.6497794  0.20809636 -0.01545347
## 1846       6   0.3672157  0.4724671506  0.6362718  0.20809636 -0.01545347
## 1847       0   0.3672157  0.4724671506  0.6362718  0.20809636 -0.01545347
## 1848      -8   0.6333928  0.4724671506  0.6497794  0.20809636 -0.01545347
## 1849      -7   0.8995699  0.4724671506  0.6632869  0.43163606 -0.01545347
## 1850      -7   1.1657469  0.4724671506  0.6903020  0.43163606 -0.01545347
## 1851      -6   1.1657469  0.4724671506  0.7038095  0.65517575 -0.01545347
## 1852      -6   1.4319240  0.4724671506  0.7173171  0.65517575 -0.01545347
## 1853      -5   1.6981011  0.4724671506  0.7308246  0.87871545 -0.01545347
## 1854      -2   2.2304552  0.4899499787  0.7443322  1.10225514 -0.01545347
## 1855       2   1.6981011  0.4899499787  0.7443322  1.32579484 -0.01545347
## 1856       5   0.8995699  0.4899499787  0.7308246  1.32579484 -0.01545347
## 1857       6   0.3672157  0.4899499787  0.7038095  1.32579484 -0.01545347
## 1858       6   0.3672157  0.4899499787  0.6903020  1.10225514 -0.01545347
## 1859       7   0.3672157  0.4899499787  0.6767945  1.10225514 -0.01545347
## 1860       6   0.3672157  0.4899499787  0.6632869  0.87871545 -0.01545347
## 1861       6   0.3672157  0.4899499787  0.6497794  0.87871545 -0.01545347
## 1862       6   0.3672157  0.4899499787  0.6497794  0.65517575 -0.01545347
## 1863       3   0.3672157  0.4899499787  0.6362718  0.65517575 -0.01545347
## 1864      -4   0.1010386  0.4899499787  0.6362718  0.65517575 -0.01545347
## 1865      -9   0.1010386  0.4899499787  0.6632869  0.65517575 -0.01545347
## 1866      -8   0.1010386  0.4899499787  0.6903020  0.65517575 -0.01545347
## 1867      -7   0.1010386  0.4899499787  0.7038095  0.65517575 -0.01545347
## 1868       0   0.1010386  0.4899499787  0.7173171  0.65517575 -0.01545347
## 1869       5   0.1010386  0.4899499787  0.7173171  0.65517575 -0.01545347
## 1870       6   0.3672157  0.4899499787  0.7038095  0.43163606 -0.01545347
## 1871       7   0.3672157  0.4899499787  0.6903020  0.43163606 -0.01545347
## 1872       7   0.3672157  0.4899499787  0.6767945  0.43163606 -0.01545347
## 1873       7   0.6333928  0.4899499787  0.6632869  0.20809636 -0.01545347
## 1874       7   0.6333928  0.4899499787  0.6497794  0.20809636 -0.01545347
## 1875       6   0.6333928  0.4899499787  0.6497794  0.20809636 -0.01545347
## 1876       6   0.6333928  0.4899499787  0.6362718 -0.01544333 -0.01545347
## 1877       2   0.6333928  0.4899499787  0.6227643 -0.01544333 -0.01545347
## 1878      -6   0.6333928  0.4724671506  0.6362718  0.20809636 -0.01545347
## 1879      -8   0.6333928  0.4724671506  0.6497794  0.20809636 -0.01545347
## 1880      -8   0.6333928  0.4724671506  0.6767945  0.20809636 -0.01545347
## 1881      -8   0.6333928  0.4724671506  0.6903020  0.43163606 -0.01545347
```

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## 1882      -8   0.6333928   0.4724671506   0.7173171    0.43163606  -0.01545347
## 1883      -6   0.8995699   0.4724671506   0.7308246    0.43163606  -0.01545347
## 1884       0   0.8995699   0.4899499787   0.7443322    0.65517575  -0.01545347
## 1885       4   0.6333928   0.4899499787   0.7308246    0.65517575  -0.01545347
## 1886       6   0.3672157   0.4899499787   0.7173171    0.65517575  -0.01545347
## 1887       7   0.3672157   0.4899499787   0.7038095    0.43163606  -0.01545347
## 1888       7   0.3672157   0.4899499787   0.6903020    0.43163606  -0.01545347
## 1889       7   0.6333928   0.4899499787   0.6767945    0.43163606  -0.01545347
## 1890       7   0.6333928   0.4899499787   0.6632869    0.20809636  -0.01545347
## 1891       7   0.6333928   0.4899499787   0.6497794    0.20809636  -0.01545347
## 1892       1   0.6333928   0.4724671506   0.6497794    0.20809636  -0.01545347
## 1893      -7   0.6333928   0.4724671506   0.6497794    0.20809636  -0.01545347
## 1894      -8   0.3672157   0.4724671506   0.6767945    0.43163606  -0.01545347
## 1895      -8   0.3672157   0.4724671506   0.7038095    0.43163606  -0.01545347
## 1896      -7   0.3672157   0.4724671506   0.7173171    0.43163606  -0.01545347
## 1897       0   0.3672157   0.4899499787   0.7308246    0.43163606  -0.01545347
## 1898       4   0.3672157   0.4899499787   0.7308246    0.43163606  -0.01545347
## 1899       6   0.3672157   0.4899499787   0.7173171    0.43163606  -0.01545347
## 1900       6   0.3672157   0.4899499787   0.7038095    0.43163606  -0.01545347
## 1901       6   0.3672157   0.4899499787   0.6903020    0.20809636  -0.01545347
## 1902       6   0.3672157   0.4899499787   0.6767945    0.20809636  -0.01545347
## 1903       6   0.3672157   0.4899499787   0.6632869    0.20809636  -0.01545347
## 1904       6   0.6333928   0.4899499787   0.6497794    0.20809636  -0.01545347
## 1905       8   0.3672157   0.4899499787   0.6362718    0.20809636  -0.01545347
## 1906       8   0.1010386   0.4899499787   0.6227643    0.20809636  -0.01545347
## 1907       8   0.1010386   0.4899499787   0.6092567   -0.01544333  -0.01545347
## 1908       8   0.1010386   0.4899499787   0.5957492   -0.01544333  -0.01545347
## 1909       8   0.1010386   0.4899499787   0.5822416   -0.01544333  -0.01545347
## 1910       8   0.1010386   0.4899499787   0.5687341   -0.01544333  -0.01545347
## 1911       8   0.1010386   0.4899499787   0.5552265   -0.01544333  -0.01545347
## 1912       8   0.1010386   0.4899499787   0.5552265   -0.01544333  -0.01545347
## 1913       8   0.1010386   0.4899499787   0.5417190   -0.23898303  -0.01545347
## 1914       8   0.1010386   0.4899499787   0.5282114   -0.23898303  -0.01545347
## 1915       8   0.1010386   0.4899499787   0.5282114   -0.23898303  -0.01545347
## 1916       8   0.1010386   0.4899499787   0.5147039   -0.23898303  -0.01545347
## 1917       8   0.1010386   0.4899499787   0.5147039   -0.46252272  -0.01545347
## 1918       8   0.1010386   0.4899499787   0.5011963   -0.46252272  -0.01545347
## 1919       8   0.1010386   0.4899499787   0.5011963   -0.46252272  -0.01545347
## 1920       8   0.1010386   0.4899499787   0.4876888   -0.46252272  -0.01545347
## 1921       8   0.1010386   0.4899499787   0.4876888   -0.46252272  -0.01545347
## 1922       8   0.1010386   0.4899499787   0.4741813   -0.68606242  -0.01545347
## 1923       8   0.1010386   0.4899499787   0.4741813   -0.68606242  -0.01545347
## 1924       8   0.1010386   0.4724671506   0.4741813   -0.68606242  -0.01545347
## 1925       8   0.1010386   0.4724671506   0.4606737   -0.68606242  -0.01545347
## 1926       8   0.1010386   0.4899499787   0.4606737   -0.68606242  -0.01545347
## 1927       8   0.1010386   0.4899499787   0.4606737   -0.68606242  -0.01545347
## 1928       8   0.1010386   0.4899499787   0.4606737   -0.68606242  -0.01545347
## 1929       8   0.1010386   0.4899499787   0.4471662   -0.68606242  -0.01545347
## 1930       8   0.1010386   0.4899499787   0.4471662   -0.90960211  -0.01545347
## 1931       8   0.1010386   0.4899499787   0.4471662   -0.90960211  -0.01545347
## 1932       8   0.1010386   0.4899499787   0.4471662   -0.90960211  -0.01545347
## 1933       8   0.1010386   0.4899499787   0.4471662   -0.90960211  -0.01545347
## 1934       8   0.3672157   0.4724671506   0.4336586   -0.90960211  -0.01545347
## 1935       8   0.3672157   0.4899499787   0.4336586   -0.90960211  -0.01545347
```

```
## 1936     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1937     8   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1938     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1939     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1940     8   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1941     8   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1942     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1943     9   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1944     9   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1945     9   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1946     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1947     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1948     8   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1949     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1950     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1951     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1952     9   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1953     8   0.1010386   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1954     8   0.3672157   0.4724671506   0.4336586 -0.90960211 -0.01545347
## 1955     8   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1956     9   0.3672157   0.4899499787   0.4336586 -0.90960211 -0.01545347
## 1957     8   0.1010386   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1958     8   0.1010386   0.4724671506   0.4201511 -0.90960211 -0.01545347
## 1959     8   0.3672157   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1960     9   0.1010386   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1961     9   0.3672157   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1962     8   0.6333928   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1963     8   0.6333928   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1964     8   0.6333928   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1965     8   0.8995699   0.4899499787   0.4201511 -0.90960211 -0.01545347
## 1966     7   1.1657469   0.4899499787   0.4201511 -0.68606242 -0.01545347
## 1967     6   1.4319240   0.4899499787   0.4201511 -0.68606242 -0.01545347
## 1968     4   1.1657469   0.4724671506   0.4201511 -0.46252272 -0.01545347
## 1969     2   0.8995699   0.4724671506   0.4336586 -0.46252272 -0.01545347
## 1970     1   0.8995699   0.4724671506   0.4471662 -0.23898303 -0.01545347
## 1971     1   0.3672157   0.4724671506   0.4606737 -0.23898303 -0.01545347
## 1972     1   0.3672157   0.4724671506   0.4606737 -0.23898303 -0.01545347
## 1973     1   0.1010386   0.4899499787   0.4741813 -0.01544333 -0.01545347
## 1974     1   0.3672157   0.4899499787   0.4876888 -0.01544333 -0.01545347
## 1975     2   0.3672157   0.4899499787   0.4876888 -0.01544333 -0.01545347
## 1976     2   0.1010386   0.4899499787   0.5011963 -0.01544333 -0.01545347
## 1977     2   0.1010386   0.4899499787   0.5011963 -0.01544333 -0.01545347
## 1978     2   0.1010386   0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1979     2   0.1010386   0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1980     2   0.1010386   0.4899499787   0.5147039 -0.01544333 -0.01545347
## 1981     1   0.3672157   0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1982     1   0.3672157   0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1983     1   0.3672157   0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1984     1   0.3672157   0.4899499787   0.5282114 -0.01544333 -0.01545347
## 1985     2   0.3672157   0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1986     1   0.3672157   0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1987     0   0.1010386   0.4724671506   0.5417190 -0.01544333 -0.01545347
## 1988     0   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 1989     0   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
```

```
## 1990     1    0.1010386   0.4724671506   0.5552265  -0.01544333  -0.01545347
## 1991     0    0.1010386   0.4724671506   0.5552265  -0.01544333  -0.01545347
## 1992    -7    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 1993    -8    0.1010386   0.4899499787   0.5822416  -0.01544333  -0.01545347
## 1994    -6    0.1010386   0.4724671506   0.6092567   0.20809636  -0.01545347
## 1995     0    0.1010386   0.4724671506   0.6227643   0.20809636  -0.01545347
## 1996     1    0.1010386   0.4724671506   0.6227643   0.20809636  -0.01545347
## 1997     2    0.1010386   0.4724671506   0.6227643   0.20809636  -0.01545347
## 1998     3    0.1010386   0.4724671506   0.6092567   0.20809636  -0.01545347
## 1999     4    0.1010386   0.4724671506   0.6092567   0.20809636  -0.01545347
## 2000     4    0.1010386   0.4724671506   0.6092567   0.20809636  -0.01545347
## 2001    -1    0.1010386   0.4724671506   0.6092567   0.20809636  -0.01545347
## 2002    -8    0.1010386   0.4724671506   0.6227643   0.20809636  -0.01545347
## 2003    -8    0.3672157   0.4724671506   0.6362718   0.20809636  -0.01545347
## 2004    -8    0.6333928   0.4724671506   0.6632869   0.20809636  -0.01545347
## 2005    -5    0.6333928   0.4724671506   0.6903020   0.43163606  -0.01545347
## 2006     1    0.3672157   0.4724671506   0.6903020   0.43163606  -0.01545347
## 2007     4    0.3672157   0.4724671506   0.6903020   0.43163606  -0.01545347
## 2008     5    0.3672157   0.4724671506   0.6767945   0.43163606  -0.01545347
## 2009     5    0.3672157   0.4724671506   0.6632869   0.20809636  -0.01545347
## 2010     5    0.3672157   0.4724671506   0.6497794   0.20809636  -0.01545347
## 2011     5    0.3672157   0.4724671506   0.6497794   0.20809636  -0.01545347
## 2012     5    0.3672157   0.4724671506   0.6362718   0.20809636  -0.01545347
## 2013     5    0.3672157   0.4724671506   0.6227643   0.20809636  -0.01545347
## 2014     5    0.3672157   0.4724671506   0.6092567   0.20809636  -0.01545347
## 2015     5    0.3672157   0.4724671506   0.6092567   0.20809636  -0.01545347
## 2016     4    0.1010386   0.4899499787   0.5957492   0.20809636  -0.01545347
## 2017     4    0.1010386   0.4899499787   0.5957492   0.20809636  -0.01545347
## 2018     4    0.1010386   0.4899499787   0.5957492   0.20809636  -0.01545347
## 2019     4    0.1010386   0.4899499787   0.5822416   0.20809636  -0.01545347
## 2020     4    0.1010386   0.4899499787   0.5822416   0.20809636  -0.01545347
## 2021     4    0.1010386   0.4899499787   0.5822416   0.20809636  -0.01545347
## 2022     4    0.1010386   0.4899499787   0.5822416   0.20809636  -0.01545347
## 2023     4    0.1010386   0.4899499787   0.5687341   0.20809636  -0.01545347
## 2024     4    0.1010386   0.4899499787   0.5687341  -0.01544333  -0.01545347
## 2025     7   -0.1651384   0.4899499787   0.5687341  -0.01544333  -0.01545347
## 2026     6    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2027     5    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2028     5    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2029     4    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2030     4    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2031     4    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2032     4    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2033     4    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2034     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2035     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2036     3    0.3672157   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2037     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2038     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2039     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2040     3    0.3672157   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2041     3    0.3672157   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2042     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
## 2043     3    0.1010386   0.4899499787   0.5552265  -0.01544333  -0.01545347
```

```
## 2044    3    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2045    3    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2046    3    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2047    3    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2048    3    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2049    3    0.6333928  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2050    2    0.6333928  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2051    2    0.6333928  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2052    2    0.8995699  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2053    2    0.8995699  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2054    2    0.6333928  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2055    2    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2056    2    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2057    2    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2058    3    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2059    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2060    2    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2061    2    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2062    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2063    2    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2064    1    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2065    1    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2066    1    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2067    1    0.3672157  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2068    1    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2069    1    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2070    1    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2071    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2072    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2073    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2074    3   -0.1651384  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2075    3   -0.1651384  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2076    3    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2077    4    0.1010386  0.4724671506  0.5552265 -0.01544333 -0.01545347
## 2078    4    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2079    4    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2080    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2081    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2082    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2083    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2084    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2085    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2086    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2087    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2088    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2089    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2090    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2091    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2092    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2093    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2094    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2095    5    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2096    4    0.3672157  0.4899499787  0.5552265 -0.01544333 -0.01545347
## 2097    4    0.1010386  0.4899499787  0.5552265 -0.01544333 -0.01545347
```

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## 2098      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2099      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2100      3   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2101      3   0.6333928   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2102      2   0.6333928   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2103      2   0.6333928   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2104      3   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2105      3   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2106      3   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2107      3   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2108      3   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2109      3   0.3672157   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2110      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2111      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2112      3   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2113      3   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2114      3   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2115      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2116      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2117      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2118      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2119      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2120      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2121      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2122      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2123      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2124      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2125      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2126      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2127      4   0.1010386   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2128      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2129      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2130      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2131      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2132      4   0.3672157   0.4899499787   0.5552265 -0.01544333 -0.01545347
## 2133      3  -0.1651384   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2134      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
## 2135      3   0.1010386   0.4724671506   0.5552265 -0.01544333 -0.01545347
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```

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```

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## 5935      -5   0.3672157 -2.6744418949  0.5552265 -0.01544333 -0.01545347
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## 6201      -4   0.1010386 -2.6744418949  0.5552265 -0.01544333 -0.01545347
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## 6308        0   0.1010386 -2.6744418949   0.6767945   0.20809636 -0.01545347
## 6309        0   0.1010386 -2.6744418949   0.6767945   0.20809636 -0.01545347
```

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## 6310        0   0.1010386 -2.6744418949   0.6632869   0.20809636 -0.01545347
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## 6312       -2   0.1010386 -2.6744418949   0.6632869   0.20809636 -0.01545347
## 6313       -4   0.1010386 -2.6744418949   0.6632869   0.20809636 -0.01545347
## 6314       -5   0.1010386 -2.6744418949   0.6497794   0.20809636 -0.01545347
## 6315       -5   0.1010386 -2.6744418949   0.6362718   0.20809636 -0.01545347
## 6316       -5   0.1010386 -2.6744418949   0.6362718   0.20809636 -0.01545347
## 6317       -5   0.1010386 -2.6569590669   0.6227643 -0.01544333 -0.01545347
## 6318       -5   0.1010386 -2.6569590669   0.6092567 -0.01544333 -0.01545347
## 6319       -7   0.1010386 -2.6744418949   0.5957492 -0.01544333 -0.01545347
## 6320       -7   0.1010386 -2.6569590669   0.5822416 -0.01544333 -0.01545347
## 6321       -7   0.1010386 -2.6569590669   0.5822416 -0.01544333 -0.01545347
## 6322       -7   0.1010386 -2.6569590669   0.5687341 -0.01544333 -0.01545347
## 6323       -7   0.1010386 -2.6569590669   0.5552265 -0.01544333 -0.01545347
## 6324       -7   0.1010386 -2.6569590669   0.5552265 -0.01544333 -0.01545347
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## 6326       -7   0.1010386 -2.6744418949   0.5417190 -0.01544333 -0.01545347
## 6327       -7   0.1010386 -2.6744418949   0.5282114 -0.01544333 -0.01545347
## 6328       -7   0.1010386 -2.6744418949   0.5147039 -0.01544333 -0.01545347
## 6329       -7   0.1010386 -2.6744418949   0.5147039 -0.01544333 -0.01545347
## 6330       -7   0.1010386 -2.6744418949   0.5011963 -0.01544333 -0.01545347
## 6331       -7   0.1010386 -2.6744418949   0.5011963 -0.01544333 -0.01545347
## 6332       -7   0.1010386 -2.6569590669   0.5011963 -0.01544333 -0.01545347
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## 6334       -7   0.1010386 -2.6569590669   0.4876888 -0.01544333 -0.01545347
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## 6342       -7   0.1010386 -2.6569590669   0.4606737 -0.01544333 -0.01545347
## 6343       -7   0.1010386 -2.6569590669   0.4606737 -0.01544333 -0.01545347
## 6344       -7   0.1010386 -2.6569590669   0.4606737 -0.01544333 -0.01545347
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## 6348       -7   0.1010386 -2.6744418949   0.4471662 -0.23898303 -0.01545347
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## 6353       -8   0.1010386 -2.6569590669   0.4471662 -0.23898303 -0.01545347
## 6354       -7   0.1010386 -2.6569590669   0.4471662 -0.23898303 -0.01545347
## 6355       -7   0.1010386 -2.6744418949   0.4471662 -0.23898303 -0.01545347
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## 6363       -8   0.1010386 -2.6744418949   0.4336586 -0.23898303 -0.01545347
```

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## 6364       -7    0.1010386 -2.6569590669    0.4336586 -0.23898303 -0.01545347
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## 6367       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
## 6368       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
## 6369       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
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## 6373       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
## 6374       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
## 6375       -7    0.1010386 -2.6744418949    0.4471662 -0.23898303 -0.01545347
## 6376       -7    0.1010386 -2.6744418949    0.4471662 -0.23898303 -0.01545347
## 6377       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
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## 6383       -7    0.1010386 -2.6569590669    0.4471662 -0.23898303 -0.01545347
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## 6385       -7    0.1010386 -2.6744418949    0.4471662 -0.23898303 -0.01545347
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## 6387       -7    0.1010386 -2.6744418949    0.4471662 -0.46252272 -0.01545347
## 6388       -7    0.1010386 -2.6569590669    0.4471662 -0.46252272 -0.01545347
## 6389       -7    0.1010386 -2.6569590669    0.4471662 -0.46252272 -0.01545347
## 6390       -7    0.1010386 -2.6569590669    0.4471662 -0.46252272 -0.01545347
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## 6404       -7    0.1010386 -2.6569590669    0.4606737 -0.23898303 -0.01545347
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## 6406       -7    0.1010386 -2.6569590669    0.4606737 -0.23898303 -0.01545347
## 6407       -7    0.1010386 -2.6569590669    0.4606737 -0.46252272 -0.01545347
## 6408       -7    0.1010386 -2.6744418949    0.4606737 -0.46252272 -0.01545347
## 6409       -7    0.1010386 -2.6744418949    0.4606737 -0.46252272 -0.01545347
## 6410       -7    0.1010386 -2.6744418949    0.4606737 -0.46252272 -0.01545347
## 6411       -7    0.1010386 -2.6744418949    0.4606737 -0.46252272 -0.01545347
## 6412       -7    0.1010386 -2.6744418949    0.4606737 -0.46252272 -0.01545347
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## 6414       -7    0.1010386 -2.6569590669    0.4606737 -0.46252272 -0.01545347
## 6415       -7    0.1010386 -2.6569590669    0.4606737 -0.23898303 -0.01545347
## 6416       -7   -0.1651384 -2.6569590669    0.4606737 -0.23898303 -0.01545347
## 6417       -7   -0.1651384 -2.6569590669    0.4606737 -0.23898303 -0.01545347
```

```
## 6418          -7  -0.1651384 -2.6569590669   0.4606737 -0.23898303 -0.01545347
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## 6425          -3   0.1010386 -2.6744418949   0.5011963 -0.01544333 -0.01545347
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## 6427          -3   0.1010386 -2.6744418949   0.5147039 -0.01544333 -0.01545347
## 6428          -3   0.1010386 -2.6744418949   0.5282114 -0.01544333 -0.01545347
## 6429          -1   0.1010386 -2.6744418949   0.5282114 -0.01544333 -0.01545347
## 6430           5  -0.4313155 -2.6744418949   0.5417190 -0.01544333 -0.01545347
## 6431           7  -0.4313155 -2.6744418949   0.5687341 -0.01544333 -0.01545347
## 6432           6  -0.1651384 -2.6744418949   0.5822416  0.20809636 -0.01545347
## 6433           6  -0.1651384 -2.6744418949   0.6092567  0.20809636 -0.01545347
## 6434           6  -0.1651384 -2.6744418949   0.6362718  0.43163606 -0.01545347
## 6435           6  -0.4313155 -2.6744418949   0.6632869  0.43163606 -0.01545347
## 6436           5  -0.4313155 -2.6744418949   0.6767945  0.65517575 -0.01545347
## 6437          -1  -0.1651384 -2.6569590669   0.6903020  0.65517575 -0.01545347
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## 6441          -7   0.1010386 -2.6744418949   0.6632869  0.43163606 -0.01545347
## 6442          -7   0.1010386 -2.6744418949   0.6497794  0.43163606 -0.01545347
## 6443          -7   0.1010386 -2.6569590669   0.6362718  0.43163606 -0.01545347
## 6444          -7   0.1010386 -2.6569590669   0.6227643  0.43163606 -0.01545347
## 6445          -7   0.1010386 -2.6569590669   0.6227643  0.43163606 -0.01545347
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## 6447          -6   0.1010386 -2.6569590669   0.6092567  0.20809636 -0.01545347
## 6448          -6   0.1010386 -2.6569590669   0.5957492  0.20809636 -0.01545347
## 6449          -6   0.1010386 -2.6569590669   0.5957492 -0.01544333 -0.01545347
## 6450          -6   0.1010386 -2.6569590669   0.5822416 -0.01544333 -0.01545347
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## 6452          -2   0.1010386 -2.6569590669   0.5822416 -0.01544333 -0.01545347
## 6453           4  -0.4313155 -2.6744418949   0.5822416 -0.01544333 -0.01545347
## 6454           7  -0.4313155 -2.6744418949   0.6092567  0.20809636 -0.01545347
## 6455           6  -0.4313155 -2.6744418949   0.6362718  0.20809636 -0.01545347
## 6456           5  -0.6974926 -2.6744418949   0.6497794  0.43163606 -0.01545347
## 6457           0  -0.4313155 -2.6569590669   0.6632869  0.65517575 -0.01545347
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## 6459          -5   0.1010386 -2.6569590669   0.6632869  0.65517575 -0.01545347
## 6460          -6   0.1010386 -2.6569590669   0.6497794  0.43163606 -0.01545347
## 6461          -6   0.1010386 -2.6569590669   0.6362718  0.43163606 -0.01545347
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## 6463          -6   0.1010386 -2.6569590669   0.6227643  0.43163606 -0.01545347
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## 6468          -6   0.1010386 -2.6569590669   0.5957492  0.20809636 -0.01545347
## 6469          -3   0.1010386 -2.6744418949   0.5822416  0.20809636 -0.01545347
## 6470           3   0.1010386 -2.6744418949   0.5957492  0.20809636 -0.01545347
## 6471           7  -0.1651384 -2.6744418949   0.6092567  0.20809636 -0.01545347
```

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## 6473      7   0.1010386 -2.6744418949  0.6362718  0.20809636 -0.01545347
## 6474      7   0.1010386 -2.6744418949  0.6632869  0.43163606 -0.01545347
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## 6489     -7   0.3672157 -2.6744418949  0.7308246  0.65517575 -0.01545347
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## 6493     -7   0.3672157 -2.6744418949  0.6632869  0.43163606 -0.01545347
## 6494     -7   0.3672157 -2.6744418949  0.6497794  0.43163606 -0.01545347
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## 6496     -5   0.1010386 -2.6744418949  0.6227643  0.20809636 -0.01545347
## 6497     -4   0.1010386 -2.6744418949  0.6092567  0.20809636 -0.01545347
## 6498     -4   0.1010386 -2.6744418949  0.6092567  0.20809636 -0.01545347
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## 6504      7   0.1010386 -2.6569590669  0.6227643  0.20809636 -0.01545347
## 6505      7   0.1010386 -2.6569590669  0.6497794  0.20809636 -0.01545347
## 6506      7   0.1010386 -2.6569590669  0.6903020  0.20809636 -0.01545347
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## 6509      7   0.1010386 -2.6569590669  0.7308246  0.43163606 -0.01545347
## 6510      7   0.1010386 -2.6569590669  0.7443322  0.43163606 -0.01545347
## 6511      4   0.1010386 -2.6569590669  0.7578397  0.43163606 -0.01545347
## 6512     -2   0.1010386 -2.6569590669  0.7578397  0.43163606 -0.01545347
## 6513     -5   0.1010386 -2.6569590669  0.7578397  0.43163606 -0.01545347
## 6514     -6   0.1010386 -2.6569590669  0.7308246  0.43163606 -0.01545347
## 6515     -6   0.1010386 -2.6569590669  0.7173171  0.43163606 -0.01545347
## 6516     -6   0.3672157 -2.6569590669  0.7038095  0.43163606 -0.01545347
## 6517     -6   0.3672157 -2.6569590669  0.6903020  0.43163606 -0.01545347
## 6518     -6   0.3672157 -2.6569590669  0.6767945  0.43163606  0.84357747
## 6519     -6   0.3672157 -2.6569590669  0.6632869  0.20809636  0.84357747
## 6520     -6   0.3672157 -2.6569590669  0.6497794  0.20809636  1.70260842
## 6521     -6   0.3672157 -2.6569590669  0.6362718  0.20809636  2.56163936
## 6522     -6   0.1010386 -2.6569590669  0.6227643 -0.01544333  3.42067030
## 6523     -5   0.1010386 -2.6569590669  0.6227643 -0.01544333  4.27970124
## 6524     -5   0.1010386 -2.6744418949  0.6092567 -0.01544333  4.27970124
## 6525     -5   0.1010386 -2.6744418949  0.5957492 -0.01544333  4.27970124
```

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## 6526      -4   0.1010386 -2.6569590669  0.5957492 -0.01544333  4.27970124
## 6527      -4   0.1010386 -2.6569590669  0.5957492 -0.01544333  4.27970124
## 6528      -5   0.1010386 -2.6569590669  0.5822416 -0.01544333  4.27970124
## 6529      -6   0.1010386 -2.6744418949  0.5822416 -0.01544333  4.27970124
## 6530      -5   0.1010386 -2.6744418949  0.5687341 -0.01544333  4.27970124
## 6531      -5   0.1010386 -2.6744418949  0.5687341 -0.01544333  3.42067030
## 6532      -5   0.1010386 -2.6744418949  0.5687341 -0.01544333  3.42067030
## 6533      -5   0.1010386 -2.6744418949  0.5687341 -0.01544333  3.42067030
## 6534      -5   0.1010386 -2.6744418949  0.5552265 -0.01544333  3.42067030
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## 6536      -4   0.1010386 -2.6744418949  0.5552265 -0.01544333  3.42067030
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## 6543      -3   0.3672157 -2.6744418949  0.5552265 -0.01544333  1.70260842
## 6544      -3   0.3672157 -2.6744418949  0.5687341 -0.01544333  1.70260842
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## 6547      -2   0.3672157 -2.6744418949  0.5687341 -0.01544333  0.84357747
## 6548      -3   0.3672157 -2.6744418949  0.5687341 -0.01544333 -0.01545347
## 6549      -3   0.1010386 -2.6744418949  0.5822416 -0.01544333 -0.01545347
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## 6551      -3   0.1010386 -2.6569590669  0.5822416 -0.01544333 -0.01545347
## 6552      -2   0.1010386 -2.6569590669  0.5822416 -0.01544333 -0.01545347
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## 6557      -3   0.1010386 -2.6744418949  0.5822416  0.20809636 -0.01545347
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## 6559      -3   0.1010386 -2.6744418949  0.5822416  0.20809636 -0.87448441
## 6560      -3   0.1010386 -2.6744418949  0.5822416  0.20809636 -2.59254629
## 6561      -3   0.1010386 -2.6744418949  0.5822416  0.20809636 -3.45157723
## 6562      -3   0.1010386 -2.6744418949  0.5822416  0.20809636 -5.16963911
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## 6570      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  1.70260842
## 6571      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
## 6572      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
## 6573      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
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## 6575      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
## 6576      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
## 6577      -4   0.1010386 -2.6744418949  0.5687341 -0.01544333  2.56163936
## 6578      -4   0.3672157 -2.6744418949  0.5687341 -0.01544333  0.84357747
## 6579      -3   0.3672157 -2.6744418949  0.5687341 -0.01544333 -0.87448441
```

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## 6580         -3   0.1010386 -2.6744418949  0.5687341 -0.01544333 -2.59254629
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## 6582         -3   0.3672157 -2.6744418949  0.5687341 -0.01544333 -2.59254629
## 6583         -3   0.3672157 -2.6744418949  0.5687341 -0.01544333 -1.73351535
## 6584         -4   0.3672157 -2.6744418949  0.5687341 -0.01544333 -0.87448441
## 6585         -4   0.3672157 -2.6744418949  0.5687341 -0.01544333 -1.73351535
## 6586         -4   0.1010386 -2.6744418949  0.5687341 -0.01544333 -2.59254629
## 6587         -4   0.3672157 -2.6744418949  0.5687341 -0.01544333 -4.31060817
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## 6589         -5   0.1010386 -2.6744418949  0.5687341 -0.01544333 -6.88770100
## 6590         -5   0.1010386 -2.6744418949  0.5552265 -0.01544333 -7.74673194
## 6591         -5   0.1010386 -2.6744418949  0.5552265 -0.01544333 -7.74673194
## 6592         -5   0.1010386 -2.6744418949  0.5552265 -0.01544333 -8.60576288
## 6593         -5   0.1010386 -2.6744418949  0.5552265 -0.01544333 -8.60576288
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## 6598         -4   0.1010386 -2.6744418949  0.5552265 -0.01544333 -0.87448441
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## 6601         -6   0.1010386 -2.6744418949  0.5552265 -0.01544333  3.42067030
## 6602         -6   0.1010386 -2.6744418949  0.5552265 -0.01544333  5.13873218
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## 6609         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  4.27970124
## 6610         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
## 6611         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
## 6612         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
## 6613         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
## 6614         -5   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
## 6615         -4   0.1010386 -2.6744418949  0.5417190 -0.01544333  3.42067030
##          vgz       templ          h        bat       baro          agx
## 1  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9840028 -0.042813158
## 2  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841271 -0.042813158
## 3  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841271 -0.025325721
## 4  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9842513 -0.042813158
## 5  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9842016 -0.025325721
## 6  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841768 -0.007838284
## 7  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841022 -0.042813158
## 8  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9840525 -0.025325721
## 9  -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841022 -0.025325721
## 10 -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9842265 -0.025325721
## 11 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9842265 -0.025325721
## 12 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9840277 -0.025325721
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## 14 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9839780 -0.025325721
## 15 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9840774 -0.025325721
## 16 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9839531 -0.007838284
## 17 -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841022 -0.025325721
```

```
## 18   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841768  -0.007838284
## 19   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841271  -0.025325721
## 20   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841271  -0.025325721
## 21   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9840525  -0.007838284
## 22   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9840774  -0.060300595
## 23   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841271   0.097086338
## 24   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9841271   0.027136590
## 25   -0.9729425  0.18042688 -1.52567364 -0.8767365  0.9842016   2.562814959
## 26   -1.0863984  0.18042688 -1.52567364 -0.8767365  0.9842265  -9.695878399
## 27   -1.2849463  0.18042688 -1.52567364 -0.8767365  0.9845246  -6.041004060
## 28   -1.3416743  0.18042688 -1.18209439 -0.8767365  0.9848476  -5.831154815
## 29   -1.3133103  0.18042688 -1.01030477 -0.8767365  0.9853695  -7.265124652
## 30   -1.1714904  0.18042688 -0.83851515 -0.8767365  0.9854191   0.271960708
## 31   -1.0580345  0.30480411 -0.83851515 -0.8767365  0.9853695  -0.742310640
## 32   -0.9729425  0.30480411 -0.83851515 -0.8767365  0.9854191  -3.732662372
## 33   -0.9729425  0.30480411 -0.83851515 -0.8767365  0.9854440  -5.813667378
## 34   -1.0013065  0.30480411 -0.66672553 -0.8767365  0.9854688  -6.303315615
## 35   -0.9445785  0.30480411 -0.83851515 -0.8767365  0.9855185  -5.061707586
## 36   -0.9162145  0.30480411 -1.52567364 -0.8767365  0.9853943  -2.088843291
## 37   -1.0013065  0.30480411 -1.52567364 -0.8767365  0.9854688   1.233769745
## 38   -1.0863984  0.30480411 -1.52567364 -0.8767365  0.9855682  -6.705526667
## 39   -1.0296705  0.30480411 -1.52567364 -0.8767365  0.9856179  -1.459295558
## 40   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9857670 -13.298290427
## 41   -0.9162145  0.30480411 -1.52567364 -0.8767365  0.9857422  -7.737285452
## 42   -0.8027586  0.30480411 -1.52567364 -0.8767365  0.9854688   9.085628971
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## 45   -0.5758467  0.30480411 -2.04104251 -0.8767365  0.9847234   0.202010960
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## 48   -0.9445785  0.30480411 -2.38462176 -0.8767365  0.9843010  -7.037787970
## 49   -0.9729425  0.30480411 -2.38462176 -0.8767365  0.9843258   5.710553624
## 50   -0.9162145  0.30480411 -2.38462176 -0.8767365  0.9842265   0.551759701
## 51   -0.9162145  0.30480411 -2.38462176 -0.8767365  0.9842016  -3.103114639
## 52   -0.9445785  0.30480411 -1.52567364 -0.8767365  0.9842016   0.411860204
## 53   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841768   1.321206930
## 54   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841519   0.604222012
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## 57   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9842265  -0.007838284
## 58   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841022   0.009649153
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## 70   -0.9729425  0.42918133 -1.52567364 -0.8767365  0.9842016  -0.007838284
## 71   -0.9729425  0.30480411 -1.52567364 -0.8767365  0.9841519  -0.042813158
```

```
## 72   -0.9729425   0.30480411  -1.52567364  -0.8767365   0.9841271   0.009649153
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## 75   -0.9729425   0.30480411  -1.52567364  -0.8767365   0.9841022  -0.025325721
## 76   -0.9729425   0.30480411  -1.52567364  -0.8767365   0.9841271  -0.007838284
## 77   -0.9729425   0.30480411  -1.52567364  -0.8767365   0.9840774   0.009649153
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## 79   -0.9729425   0.18042688   0.87938108  -0.8832076   0.9863634   1.356181804
## 80   -0.9729425   0.18042688   0.87938108  -0.8832076   0.9863882   1.513568737
## 81   -0.9729425   0.18042688   0.87938108  -0.8832076   0.9864131   1.688443108
## 82   -0.9729425   0.30480411   0.87938108  -0.8832076   0.9862888   1.653468234
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## 85   -0.9729425   0.30480411   0.87938108  -0.8832076   0.9862640   1.373669241
## 86   -0.9729425   0.30480411   0.87938108  -0.8853646   0.9862143   1.548543611
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## 88   -0.9729425   0.30480411   0.87938108  -0.8853646   0.9861894   1.531056174
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## 278  -0.9729425 -0.06832756  0.87938108 -0.8918357  0.9867112  0.849046130
## 279  -0.9729425 -0.06832756  0.87938108 -0.8918357  0.9866864  0.814071256
## 280  -0.9729425 -0.06832756  0.87938108 -0.8918357  0.9866367  1.023920500
## 281  -0.9729425 -0.06832756  0.87938108 -0.8918357  0.9865124  0.953970752
## 282  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9864876  0.831558693
## 283  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9865124  1.268744619
## 284  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9866367  0.988945626
## 285  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9867112  0.691659197
## 286  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9866118  1.338694367
## 287  -0.9729425  0.05604966  0.87938108 -0.8918357  0.9866615  1.216282308
```

```
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## 289  -0.9729425   0.05604966   0.87938108  -0.8918357   0.9865870    0.656684323
## 290  -0.9729425   0.05604966   0.87938108  -0.8918357   0.9866864    0.674171760
## 291  -0.9729425   0.05604966   0.87938108  -0.8918357   0.9865870    0.604222012
## 292  -0.9729425  -0.06832756   0.87938108  -0.8918357   0.9870591    0.114573775
## 293  -0.9729425  -0.06832756   0.87938108  -0.8918357   0.9868355   -0.025325721
## 294  -0.9729425  -0.06832756   0.87938108  -0.8918357   0.9867858    0.271960708
## 295  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9867112   -0.112762907
## 296  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9867361   -0.305124714
## 297  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868852   -0.147737781
## 298  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868852   -0.077788032
## 299  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9869100    0.027136590
## 300  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9869597    0.044624027
## 301  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868355    0.132061212
## 302  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868852    0.167036086
## 303  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9870094    0.236985834
## 304  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9870343    0.271960708
## 305  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868852    0.341910456
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## 307  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9867858    0.027136590
## 308  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868603   -0.147737781
## 309  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9868852   -0.235174966
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## 315  -0.9729425  -0.06832756   0.87938108  -0.8939927   0.9869846   -0.969647321
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## 332  -0.9729425  -0.19270479   0.87938108  -0.8939927   0.9870094   -0.305124714
## 333  -0.9729425  -0.19270479   0.87938108  -0.8939927   0.9871088   -0.637386017
## 334  -0.9729425  -0.19270479   0.87938108  -0.8939927   0.9872330   -0.602411143
## 335  -0.9729425  -0.19270479   0.87938108  -0.8939927   0.9871833   -0.689848328
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## 355  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9871585  1.635980796
## 356  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9871833  1.705930545
## 357  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9869597  1.670955671
## 358  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9871833  1.828342604
## 359  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9871833  2.038191848
## 360  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9873573  2.195578781
## 361  -0.9729425 -0.19270479  0.87938108 -0.8939927  0.9873324  1.810855167
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## 374  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863634  2.143116470
## 375  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9864131  2.230553656
## 376  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863634  2.335478278
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## 382  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9865621  2.737689329
## 383  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9864628  2.650252144
## 384  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9865124  2.143116470
## 385  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863882  2.143116470
## 386  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9865373  1.775880293
## 387  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9866615  1.635980796
## 388  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9867361  1.950754663
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## 390  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9865373  1.443618989
## 391  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9864131  1.426131552
## 392  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9864876  1.653468234
## 393  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863385  1.566031048
## 394  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863634  1.705930545
## 395  -0.9729425 -0.19270479  0.87938108 -0.8961497  0.9863634  2.038191848
```

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## 396  -0.9729425  -0.19270479   0.87938108  -0.8961497   0.9863634   1.898292352
## 397  -0.9729425  -0.19270479   0.87938108  -0.8961497   0.9863882   1.915779789
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## 407  -0.9729425  -0.06832756   0.87938108  -0.8961497   0.9863882   1.548543611
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## 412  -0.9729425  -0.06832756   0.87938108  -0.8961497   0.9864379   2.003216974
## 413  -0.9729425  -0.06832756   0.87938108  -0.8961497   0.9864379   1.828342604
## 414  -0.9729425  -0.31708201   0.87938108  -0.8961497   0.9864876   1.705930545
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## 423  -0.9729425  -0.31708201   0.87938108  -0.8961497   0.9863882   1.111357686
## 424  -0.9729425  -0.19270479   0.87938108  -0.8961497   0.9864628   0.953970752
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## 431  -0.9729425  -0.19270479   1.05117071  -0.8961497   0.9865621   0.604222012
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## 443  -0.9729425  -0.19270479   1.05117071  -0.8961497   0.9867361   0.936483315
## 444  -0.9729425  -0.19270479   1.05117071  -0.8961497   0.9865621   0.988945626
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## 447  -0.9729425  -0.19270479   0.87938108  -0.8961497   0.9864628   1.286232056
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```
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```

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```

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## 853   1.2110842   1.54857634  -0.35750420   1.0169815  -1.1527793   0.324423019
## 854   1.2110842   1.54857634  -0.35750420   1.0169815  -1.1527793   0.306935582
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## 858   1.2110842   1.54857634  -0.35750420   1.0170031  -1.1527793   0.359397893
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## 891   1.2110842   1.54857634 -0.35750420   1.0169815 -1.1527793   0.324423019
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## 909   1.2394482   1.79733079 -0.35750420   1.0169600 -1.1527793   0.341910456
## 910   1.2394482   1.79733079 -0.35750420   1.0169600 -1.1527793   0.341910456
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```

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```

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## 1043   1.2394482  1.67295356 -0.35750420  1.0167874 -1.1527793  0.341910456
```

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## 1044   1.2394482   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1045   1.2394482   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1046   1.2394482   1.67295356 -0.35750420   1.0168737 -1.1527793   0.324423019
## 1047   1.2394482   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1048   1.2394482   1.67295356 -0.35750420   1.0168521 -1.1527793   0.341910456
## 1049   1.2394482   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1050   1.2394482   1.67295356 -0.35750420   1.0169384 -1.1527793   0.341910456
## 1051   1.2394482   1.67295356 -0.35750420   1.0168737 -1.1527793   0.324423019
## 1052   1.2110842   1.54857634 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1053   1.2110842   1.54857634 -0.35750420   1.0170031 -1.1527793   0.359397893
## 1054   1.2110842   1.54857634 -0.35750420   1.0168737 -1.1527793   0.324423019
## 1055   1.2110842   1.54857634 -0.35750420   1.0168737 -1.1527793   0.341910456
## 1056   1.2110842   1.54857634 -0.35750420   1.0168952 -1.1527793   0.341910456
## 1057   1.2110842   1.54857634 -0.35750420   1.0168521 -1.1527793   0.341910456
## 1058   1.2110842   1.54857634 -0.35750420   1.0168737 -1.1527793   0.341910456
## 1059   1.2110842   1.54857634 -0.35750420   1.0169384 -1.1527793   0.341910456
## 1060   1.2110842   1.54857634 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1061   1.2110842   1.54857634 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1062   1.2110842   1.54857634 -0.35750420   1.0168521 -1.1527793   0.341910456
## 1063   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.324423019
## 1064   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1065   1.2110842   1.67295356 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1066   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.306935582
## 1067   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.306935582
## 1068   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.306935582
## 1069   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1070   1.2110842   1.67295356 -0.35750420   1.0169600 -1.1527793   0.324423019
## 1071   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.359397893
## 1072   1.2110842   1.67295356 -0.35750420   1.0169600 -1.1527793   0.341910456
## 1073   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.359397893
## 1074   1.2110842   1.67295356 -0.35750420   1.0170247 -1.1527793   0.341910456
## 1075   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1076   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.359397893
## 1077   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.359397893
## 1078   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.324423019
## 1079   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.341910456
## 1080   1.2110842   1.67295356 -0.35750420   1.0170031 -1.1527793   0.341910456
## 1081   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.306935582
## 1082   1.2110842   1.67295356 -0.35750420   1.0168305 -1.1527793   0.359397893
## 1083   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1084   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.359397893
## 1085   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.324423019
## 1086   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.324423019
## 1087   1.2110842   1.67295356 -0.35750420   1.0168952 -1.1527793   0.306935582
## 1088   1.2110842   1.67295356 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1089   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.359397893
## 1090   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.324423019
## 1091   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1092   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.359397893
## 1093   1.2110842   1.67295356 -0.35750420   1.0169600 -1.1527793   0.341910456
## 1094   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.341910456
## 1095   1.2394482   1.67295356 -0.35750420   1.0169600 -1.1527793   0.324423019
## 1096   1.2394482   1.67295356 -0.35750420   1.0170247 -1.1527793   0.341910456
## 1097   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.359397893
```

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## 1098   1.2394482   1.67295356 -0.35750420   1.0168521 -1.1527793   0.359397893
## 1099   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1100   1.2394482   1.67295356 -0.35750420   1.0170247 -1.1527793   0.324423019
## 1101   1.2394482   1.67295356 -0.35750420   1.0168521 -1.1527793   0.324423019
## 1102   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.359397893
## 1103   1.2394482   1.67295356 -0.35750420   1.0169168 -1.1527793   0.359397893
## 1104   1.2394482   1.54857634 -0.35750420   1.0168952 -1.1527793   0.341910456
## 1105   1.2394482   1.54857634 -0.35750420   1.0169815 -1.1527793   0.324423019
## 1106   1.2394482   1.54857634 -0.35750420   1.0169384 -1.1527793   0.359397893
## 1107   1.2394482   1.54857634 -0.35750420   1.0169815 -1.1527793   0.306935582
## 1108   1.2394482   1.54857634 -0.35750420   1.0169384 -1.1527793   0.359397893
## 1109   1.2394482   1.54857634 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1110   1.2394482   1.54857634 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1111   1.2394482   1.54857634 -0.35750420   1.0168952 -1.1527793   0.359397893
## 1112   1.2394482   1.54857634 -0.35750420   1.0169384 -1.1527793   0.341910456
## 1113   1.2394482   1.54857634 -0.35750420   1.0168737 -1.1527793   0.324423019
## 1114   1.2110842   1.67295356 -0.35750420   1.0168737 -1.1527793   0.341910456
## 1115   1.2110842   1.67295356 -0.35750420   1.0167874 -1.1527793   0.324423019
## 1116   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1117   1.2110842   1.67295356 -0.35750420   1.0169384 -1.1527793   0.341910456
## 1118   1.2110842   1.67295356 -0.35750420   1.0169168 -1.1527793   0.341910456
## 1119   1.2110842   1.67295356 -0.35750420   1.0169815 -1.1527793   0.341910456
## 1120   1.2110842   1.67295356 -0.35750420   1.0168305 -1.1527793   0.341910456
## 1121   1.2110842   1.67295356 -0.35750420   1.0170247 -1.1527793   0.341910456
## 1122   1.2110842   1.67295356 -0.35750420   1.0170031 -1.1527793   0.324423019
## 1123   1.2110842   1.67295356 -0.35750420   1.0168952 -1.1527793   0.359397893
## 1124   1.2394482   1.67295356 -0.35750420   1.0168521 -1.1527793   0.324423019
## 1125   1.2394482   1.67295356 -0.35750420   1.0170031 -1.1527793   0.324423019
## 1126   1.2394482   1.67295356 -0.35750420   1.0168305 -1.1527793   0.359397893
## 1127   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.359397893
## 1128   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1129   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.359397893
## 1130   1.2394482   1.67295356 -0.35750420   1.0169384 -1.1527793   0.341910456
## 1131   1.2394482   1.67295356 -0.35750420   1.0170031 -1.1527793   0.341910456
## 1132   1.2394482   1.67295356 -0.35750420   1.0168952 -1.1527793   0.324423019
## 1133   1.2394482   1.67295356 -0.35750420   1.0170678 -1.1527793   0.341910456
## 1134   1.2961762   2.04608523 -0.40904109   1.0164423 -1.1527793   0.341910456
## 1135   1.2961762   2.04608523 -0.40904109   1.0163991 -1.1527793   0.324423019
## 1136   1.2961762   2.04608523 -0.40904109   1.0165933 -1.1527793   0.324423019
## 1137   1.2961762   2.04608523 -0.40904109   1.0164854 -1.1527793   0.324423019
## 1138   1.2678122   1.92170801 -0.40904109   1.0165933 -1.1527793   0.306935582
## 1139   1.2678122   1.92170801 -0.40904109   1.0165285 -1.1527793   0.306935582
## 1140   1.2678122   1.92170801 -0.40904109   1.0164854 -1.1527793   0.324423019
## 1141   1.2678122   1.92170801 -0.40904109   1.0164638 -1.1527793   0.324423019
## 1142   1.2678122   1.92170801 -0.40904109   1.0164423 -1.1527793   0.324423019
## 1143   1.2678122   1.92170801 -0.40904109   1.0165501 -1.1527793   0.341910456
## 1144   1.2678122   1.92170801 -0.40904109   1.0164854 -1.1527793   0.341910456
## 1145   1.2678122   1.92170801 -0.40904109   1.0163128 -1.1527793   0.324423019
## 1146   1.2678122   1.92170801 -0.40904109   1.0164854 -1.1527793   0.324423019
## 1147   1.2678122   1.92170801 -0.40904109   1.0164423 -1.1527793   0.359397893
## 1148   1.2961762   1.92170801 -0.40904109   1.0164423 -1.1527793   0.306935582
## 1149   1.2961762   1.92170801 -0.40904109   1.0163776 -1.1527793   0.324423019
## 1150   1.2961762   1.92170801 -0.40904109   1.0165070 -1.1527793   0.341910456
## 1151   1.2961762   1.92170801 -0.40904109   1.0165501 -1.1527793   0.306935582
```

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## 1152   1.2961762   1.92170801  -0.40904109   1.0165070  -1.1527793   0.324423019
## 1153   1.2961762   1.92170801  -0.40904109   1.0163776  -1.1527793   0.306935582
## 1154   1.2961762   1.92170801  -0.40904109   1.0165285  -1.1527793   0.324423019
## 1155   1.2961762   1.92170801  -0.40904109   1.0164423  -1.1527793   0.324423019
## 1156   1.2961762   1.92170801  -0.40904109   1.0163991  -1.1527793   0.324423019
## 1157   1.2961762   1.92170801  -0.40904109   1.0164207  -1.1527793   0.324423019
## 1158   1.2678122   1.92170801  -0.40904109   1.0164854  -1.1527793   0.324423019
## 1159   1.2678122   1.92170801  -0.40904109   1.0165285  -1.1527793   0.324423019
## 1160   1.2678122   1.92170801  -0.40904109   1.0165717  -1.1527793   0.341910456
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## 1162   1.2678122   1.92170801  -0.40904109   1.0164854  -1.1527793   0.306935582
## 1163   1.2678122   1.92170801  -0.40904109   1.0165070  -1.1527793   0.341910456
## 1164   1.2678122   1.92170801  -0.40904109   1.0165717  -1.1527793   0.341910456
## 1165   1.2678122   1.92170801  -0.40904109   1.0165285  -1.1527793   0.324423019
## 1166   1.2678122   1.92170801  -0.40904109   1.0164854  -1.1527793   0.341910456
## 1167   1.2678122   1.92170801  -0.40904109   1.0165933  -1.1527793   0.324423019
## 1168   1.2961762   1.79733079  -0.40904109   1.0165717  -1.1527793   0.341910456
## 1169   1.2961762   1.79733079  -0.40904109   1.0166580  -1.1527793   0.306935582
## 1170   1.2961762   1.79733079  -0.40904109   1.0164423  -1.1527793   0.359397893
## 1171   1.2961762   1.79733079  -0.40904109   1.0164638  -1.1527793   0.324423019
## 1172   1.2961762   1.79733079  -0.40904109   1.0165933  -1.1527793   0.341910456
## 1173   1.2961762   1.79733079  -0.40904109   1.0165285  -1.1527793   0.359397893
## 1174   1.2961762   1.79733079  -0.40904109   1.0165933  -1.1527793   0.324423019
## 1175   1.2961762   1.79733079  -0.40904109   1.0165717  -1.1527793   0.324423019
## 1176   1.2961762   1.79733079  -0.40904109   1.0164423  -1.1527793   0.324423019
## 1177   1.2961762   1.79733079  -0.40904109   1.0165501  -1.1527793   0.306935582
## 1178   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.324423019
## 1179   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.306935582
## 1180   1.2961762   1.92170801  -0.40904109   1.0164423  -1.1527793   0.306935582
## 1181   1.2961762   1.92170801  -0.40904109   1.0164854  -1.1527793   0.341910456
## 1182   1.2961762   1.92170801  -0.40904109   1.0165717  -1.1527793   0.324423019
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## 1184   1.2961762   1.92170801  -0.40904109   1.0164638  -1.1527793   0.324423019
## 1185   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.341910456
## 1186   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.359397893
## 1187   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.359397893
## 1188   1.2961762   1.92170801  -0.40904109   1.0165285  -1.1527793   0.341910456
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## 1191   1.2961762   1.92170801  -0.40904109   1.0166148  -1.1527793   0.306935582
## 1192   1.2961762   1.92170801  -0.40904109   1.0166795  -1.1527793   0.324423019
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## 1194   1.2961762   1.92170801  -0.40904109   1.0165501  -1.1527793   0.306935582
## 1195   1.2961762   1.92170801  -0.40904109   1.0165501  -1.1527793   0.341910456
## 1196   1.2961762   1.92170801  -0.40904109   1.0165717  -1.1527793   0.359397893
## 1197   1.2961762   1.92170801  -0.40904109   1.0165501  -1.1527793   0.359397893
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## 1199   1.2961762   1.92170801  -0.40904109   1.0165717  -1.1527793   0.359397893
## 1200   1.2961762   1.92170801  -0.40904109   1.0164423  -1.1527793   0.341910456
## 1201   1.2961762   1.92170801  -0.40904109   1.0164854  -1.1527793   0.359397893
## 1202   1.2961762   1.92170801  -0.40904109   1.0165285  -1.1527793   0.324423019
## 1203   1.2961762   1.92170801  -0.40904109   1.0165717  -1.1527793   0.341910456
## 1204   1.2961762   1.92170801  -0.40904109   1.0165285  -1.1527793   0.324423019
## 1205   1.2961762   1.92170801  -0.40904109   1.0165501  -1.1527793   0.341910456
```

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## 1206  1.2961762  1.92170801 -0.40904109  1.0165501 -1.1527793  0.341910456
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## 1208  1.2678122  1.92170801 -0.40904109  1.0165717 -1.1527793  0.341910456
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## 1222  1.2961762  1.92170801 -0.40904109  1.0165501 -1.1527793  0.341910456
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## 1226  1.2961762  1.92170801 -0.40904109  1.0165070 -1.1527793  0.359397893
## 1227  1.2961762  1.92170801 -0.40904109  1.0165933 -1.1527793  0.341910456
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## 1229  1.2961762  1.92170801 -0.40904109  1.0165501 -1.1527793  0.341910456
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## 1231  1.2961762  1.92170801 -0.40904109  1.0166148 -1.1527793  0.341910456
## 1232  1.2961762  1.92170801 -0.40904109  1.0166795 -1.1527793  0.306935582
## 1233  1.2961762  1.92170801 -0.40904109  1.0164854 -1.1527793  0.324423019
## 1234  1.2961762  1.92170801 -0.40904109  1.0165933 -1.1527793  0.324423019
## 1235  1.2961762  1.92170801 -0.40904109  1.0166580 -1.1527793  0.359397893
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## 1239  1.2961762  1.92170801 -0.40904109  1.0165501 -1.1527793  0.341910456
## 1240  1.2961762  1.92170801 -0.40904109  1.0164854 -1.1527793  0.324423019
## 1241  1.2961762  1.92170801 -0.40904109  1.0165285 -1.1527793  0.341910456
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## 1243  1.2961762  1.92170801 -0.40904109  1.0166580 -1.1527793  0.324423019
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## 1247  1.2961762  1.92170801 -0.40904109  1.0165501 -1.1527793  0.341910456
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## 1251  1.2961762  1.92170801 -0.40904109  1.0166580 -1.1527793  0.324423019
## 1252  1.2961762  1.92170801 -0.40904109  1.0165285 -1.1527793  0.359397893
## 1253  1.2961762  1.92170801 -0.40904109  1.0165070 -1.1527793  0.324423019
## 1254  1.2961762  1.92170801 -0.40904109  1.0166795 -1.1527793  0.341910456
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## 1256  1.2961762  1.92170801 -0.40904109  1.0166795 -1.1527793  0.324423019
## 1257  1.2961762  1.92170801 -0.40904109  1.0165933 -1.1527793  0.341910456
## 1258  1.2678122  1.79733079 -0.40904109  1.0164423 -1.1527793  0.324423019
## 1259  1.2678122  1.79733079 -0.40904109  1.0165285 -1.1527793  0.341910456
```

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## 1262   1.2678122   1.79733079 -0.40904109   1.0164638 -1.1527793   0.341910456
## 1263   1.2678122   1.79733079 -0.40904109   1.0167011 -1.1527793   0.341910456
## 1264   1.2678122   1.79733079 -0.40904109   1.0165285 -1.1527793   0.324423019
## 1265   1.2678122   1.79733079 -0.40904109   1.0165717 -1.1527793   0.324423019
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## 1267   1.2678122   1.79733079 -0.40904109   1.0166148 -1.1527793   0.306935582
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## 1269   1.2961762   1.79733079 -0.40904109   1.0166148 -1.1527793   0.341910456
## 1270   1.2961762   1.79733079 -0.40904109   1.0166580 -1.1527793   0.341910456
## 1271   1.2961762   1.79733079 -0.40904109   1.0165285 -1.1527793   0.306935582
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## 1275   1.2961762   1.79733079 -0.40904109   1.0166795 -1.1527793   0.341910456
## 1276   1.2961762   1.79733079 -0.40904109   1.0166148 -1.1527793   0.324423019
## 1277   1.2961762   1.79733079 -0.40904109   1.0166148 -1.1527793   0.306935582
## 1278   1.2961762   1.92170801 -0.40904109   1.0166148 -1.1527793   0.376885330
## 1279   1.2961762   1.92170801 -0.40904109   1.0166148 -1.1527793   0.411860204
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## 1283   1.2961762   1.92170801 -0.40904109   1.0166148 -1.1527793  -0.147737781
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## 1286   1.2961762   1.92170801 -0.40904109   1.0166148 -1.1502946  -0.375074462
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## 1291   1.2678122   1.92170801 -0.40904109   1.0178012 -1.1502946  -0.252662403
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## 1318   1.2678122   1.79733079 -0.40904109   1.0207132 -1.1428402   -0.445024210
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## 1323   1.2678122   1.79733079 -0.40904109   1.0218780 -1.1428402   -0.445024210
## 1324   1.2678122   1.79733079 -0.40904109   1.0219858 -1.1428402   -0.235174966
## 1325   1.2678122   1.79733079 -0.40904109   1.0223525 -1.1403555   -0.112762907
## 1326   1.2678122   1.79733079 -0.40904109   1.0224172 -1.1403555   -0.147737781
## 1327   1.2678122   1.79733079 -0.40904109   1.0222231 -1.1403555   -0.305124714
## 1328   1.2678122   1.79733079 -0.40904109   1.0222447 -1.1403555   -0.235174966
## 1329   1.2678122   1.79733079 -0.40904109   1.0222015 -1.1403555   -0.864722699
## 1330   1.2678122   1.79733079 -0.40904109   1.0222231 -1.1403555   -0.637386017
## 1331   1.2678122   1.79733079 -0.40904109   1.0222662 -1.1403555   -0.410049336
## 1332   1.2678122   1.79733079 -0.40904109   1.0223094 -1.1403555   -0.724823203
## 1333   1.2678122   1.79733079 -0.40904109   1.0223094 -1.1403555   -1.074571943
## 1334   1.2678122   1.79733079 -0.40904109   1.0221152 -1.1403555   -0.742310640
## 1335   1.2678122   1.79733079 -0.40904109   1.0221800 -1.1378707    0.167036086
## 1336   1.2678122   1.79733079 -0.40904109   1.0220505 -1.1378707   -0.130250344
## 1337   1.2678122   1.79733079 -0.40904109   1.0224604 -1.1378707   -0.619898580
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## 1339   1.2678122   1.67295356 -0.40904109   1.0222447 -1.1378707   -0.724823203
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## 1341   1.2678122   1.67295356 -0.40904109   1.0223309 -1.1378707   -0.445024210
## 1342   1.2678122   1.67295356 -0.40904109   1.0224172 -1.1378707   -0.445024210
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## 1347   1.2678122   1.67295356 -0.40904109   1.0221800 -1.1353859   -0.287637277
## 1348   1.2394482   1.79733079 -0.40904109   1.0221584 -1.1353859   -0.060300595
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## 1352   1.2394482   1.79733079 -0.40904109   1.0221584 -1.1353859   -0.479999084
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## 1354   1.2394482   1.79733079 -0.40904109   1.0219643 -1.1329011   -0.270149840
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## 1358   1.2394482   1.67295356 -0.40904109   1.0219858 -1.1329011   -0.357587025
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## 1364   1.2394482   1.67295356 -0.40904109   1.0218995 -1.1304164   -0.287637277
## 1365   1.2394482   1.67295356 -0.40904109   1.0219427 -1.1304164   -0.305124714
## 1366   1.2394482   1.67295356 -0.40904109   1.0217701 -1.1304164   -0.375074462
## 1367   1.2394482   1.67295356 -0.40904109   1.0218348 -1.1304164   -0.340099588
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## 1371   1.2110842   1.67295356 -0.40904109   1.0218780 -1.1304164   -0.427536773
## 1372   1.2110842   1.67295356 -0.40904109   1.0220721 -1.1304164   -0.532461395
## 1373   1.2110842   1.67295356 -0.40904109   1.0219427 -1.1304164   -0.112762907
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## 1383   1.2110842   1.67295356 -0.40904109   1.0217054 -1.1279316   -0.077788032
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## 1417   1.1543562   1.29982189 -0.40904109   1.0216838 -1.1179925    0.149548649
## 1418   1.1543562   1.42419912 -0.40904109   1.0214897 -1.1179925    0.306935582
## 1419   1.1543562   1.42419912 -0.40904109   1.0215113 -1.1179925    0.341910456
## 1420   1.1543562   1.42419912 -0.40904109   1.0215328 -1.1179925    0.324423019
## 1421   1.1543562   1.42419912 -0.40904109   1.0215976 -1.1179925   -0.130250344
```

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## 1422   1.1543562   1.42419912 -0.40904109   1.0217701 -1.1179925    0.132061212
## 1423   1.1543562   1.42419912 -0.40904109   1.0215113 -1.1179925    0.167036086
## 1424   1.1543562   1.42419912 -0.40904109   1.0215760 -1.1155077    0.132061212
## 1425   1.1543562   1.42419912 -0.40904109   1.0216407 -1.1155077    0.341910456
## 1426   1.1543562   1.42419912 -0.40904109   1.0217270 -1.1155077    0.149548649
## 1427   1.1543562   1.42419912 -0.40904109   1.0215976 -1.1155077   -0.130250344
## 1428   1.1543562   1.42419912 -0.40904109   1.0216623 -1.1155077    0.236985834
## 1429   1.1543562   1.42419912 -0.40904109   1.0214250 -1.1155077   -0.130250344
## 1430   1.1543562   1.42419912 -0.40904109   1.0215328 -1.1155077    0.219498397
## 1431   1.1543562   1.42419912 -0.40904109   1.0215976 -1.1155077    0.499297390
## 1432   1.1543562   1.42419912 -0.40904109   1.0212524 -1.1155077   -0.007838284
## 1433   1.1543562   1.42419912 -0.40904109   1.0213819 -1.1155077    0.236985834
## 1434   1.1543562   1.42419912 -0.40904109   1.0212093 -1.1130229   -0.042813158
## 1435   1.1543562   1.42419912 -0.40904109   1.0212093 -1.1130229    0.359397893
## 1436   1.1543562   1.42419912 -0.40904109   1.0212309 -1.1130229    0.446835078
## 1437   1.1543562   1.42419912 -0.40904109   1.0213387 -1.1130229    0.551759701
## 1438   1.1827202   1.42419912 -0.40904109   1.0214466 -1.1130229   -0.270149840
## 1439   1.1827202   1.42419912 -0.40904109   1.0216623 -1.1130229   -0.165225218
## 1440   1.1827202   1.42419912 -0.40904109   1.0213387 -1.1130229   -0.462511647
## 1441   1.1827202   1.42419912 -0.40904109   1.0215113 -1.1130229   -0.287637277
## 1442   1.1827202   1.42419912 -0.40904109   1.0217054 -1.1130229   -0.427536773
## 1443   1.1827202   1.42419912 -0.40904109   1.0220074 -1.1130229   -0.794772951
## 1444   1.1827202   1.42419912 -0.40904109   1.0219211 -1.1105382   -0.637386017
## 1445   1.1827202   1.42419912 -0.40904109   1.0221368 -1.1105382   -0.689848328
## 1446   1.1827202   1.42419912 -0.40904109   1.0215544 -1.1105382   -0.427536773
## 1447   1.1827202   1.42419912 -0.40904109   1.0213603 -1.1105382   -0.410049336
## 1448   1.1543562   1.29982189 -0.40904109   1.0217054 -1.1105382   -0.287637277
## 1449   1.1543562   1.29982189 -0.40904109   1.0217917 -1.1105382   -0.497486521
## 1450   1.1543562   1.29982189 -0.40904109   1.0215544 -1.1105382   -0.357587025
## 1451   1.1543562   1.29982189 -0.40904109   1.0212093 -1.1105382   -0.252662403
## 1452   1.1543562   1.29982189 -0.40904109   1.0215760 -1.1105382   -0.322612151
## 1453   1.1543562   1.29982189 -0.40904109   1.0218995 -1.1105382   -0.514973958
## 1454   1.1543562   1.29982189 -0.40904109   1.0215328 -1.1080534   -0.462511647
## 1455   1.1543562   1.29982189 -0.40904109   1.0217701 -1.1080534   -0.340099588
## 1456   1.1543562   1.29982189 -0.40904109   1.0216191 -1.1080534   -0.672360891
## 1457   1.1543562   1.29982189 -0.40904109   1.0215976 -1.1080534   -0.654873454
## 1458   1.1543562   1.29982189 -0.40904109   1.0218780 -1.1080534   -0.340099588
## 1459   1.1543562   1.29982189 -0.40904109   1.0217701 -1.1080534   -0.672360891
## 1460   1.1543562   1.29982189 -0.40904109   1.0216623 -1.1080534   -0.584923706
## 1461   1.1543562   1.29982189 -0.40904109   1.0215760 -1.1080534   -0.549948832
## 1462   1.1543562   1.29982189 -0.40904109   1.0216838 -1.1080534   -0.567436269
## 1463   1.1543562   1.29982189 -0.40904109   1.0212309 -1.1080534   -0.410049336
## 1464   1.1543562   1.29982189 -0.40904109   1.0211877 -1.1055686   -0.567436269
## 1465   1.1543562   1.29982189 -0.40904109   1.0210367 -1.1055686   -0.147737781
## 1466   1.1543562   1.29982189 -0.40904109   1.0212524 -1.1055686   -0.200200092
## 1467   1.1543562   1.29982189 -0.40904109   1.0213603 -1.1055686   -0.584923706
## 1468   1.1259923   1.29982189 -0.40904109   1.0214034 -1.1055686   -0.479999084
## 1469   1.1259923   1.29982189 -0.40904109   1.0215544 -1.1055686   -0.514973958
## 1470   1.1259923   1.29982189 -0.40904109   1.0216191 -1.1055686   -0.287637277
## 1471   1.1259923   1.29982189 -0.40904109   1.0216838 -1.1055686   -0.549948832
## 1472   1.1259923   1.29982189 -0.40904109   1.0214034 -1.1055686   -0.672360891
## 1473   1.1259923   1.29982189 -0.40904109   1.0215976 -1.1030838   -0.567436269
## 1474   1.1259923   1.29982189 -0.40904109   1.0216407 -1.1030838   -0.322612151
## 1475   1.1259923   1.29982189 -0.40904109   1.0216191 -1.1030838   -0.654873454
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## 1476   1.1259923   1.29982189 -0.40904109   1.0215760 -1.1030838   -0.392561899
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## 1481   1.1543562   1.29982189 -0.40904109   1.0215976 -1.1030838   -0.375074462
## 1482   1.1543562   1.29982189 -0.40904109   1.0216407 -1.1030838   -0.147737781
## 1483   1.1543562   1.29982189 -0.40904109   1.0216191 -1.1005991   -0.287637277
## 1484   1.1543562   1.29982189 -0.40904109   1.0215976 -1.1005991   -0.287637277
## 1485   1.1543562   1.29982189 -0.40904109   1.0212956 -1.1005991   -0.217687529
## 1486   1.1543562   1.29982189 -0.40904109   1.0215760 -1.1005991   -0.357587025
## 1487   1.1543562   1.29982189 -0.40904109   1.0219211 -1.1005991   -0.252662403
## 1488   1.1543562   1.17544467 -0.40904109   1.0215113 -1.1005991   -0.252662403
## 1489   1.1543562   1.17544467 -0.40904109   1.0215760 -1.1005991   -0.025325721
## 1490   1.1543562   1.17544467 -0.40904109   1.0211877 -1.1005991   -0.060300595
## 1491   1.1543562   1.17544467 -0.40904109   1.0212740 -1.1005991    0.044624027
## 1492   1.1543562   1.17544467 -0.40904109   1.0213603 -1.1005991   -0.235174966
## 1493   1.1543562   1.17544467 -0.40904109   1.0212309 -1.0981143    0.149548649
## 1494   1.1543562   1.17544467 -0.40904109   1.0211230 -1.0981143    0.219498397
## 1495   1.1543562   1.17544467 -0.40904109   1.0213387 -1.0981143   -0.147737781
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## 1498   1.1259923   1.29982189 -0.40904109   1.0215544 -1.0981143   -0.445024210
## 1499   1.1259923   1.29982189 -0.40904109   1.0215113 -1.0981143   -0.672360891
## 1500   1.1259923   1.29982189 -0.40904109   1.0212740 -1.0981143   -0.147737781
## 1501   1.1259923   1.29982189 -0.40904109   1.0214681 -1.0981143   -0.130250344
## 1502   1.1259923   1.29982189 -0.40904109   1.0217486 -1.0981143   -0.392561899
## 1503   1.1259923   1.29982189 -0.40904109   1.0217054 -1.0956295   -0.672360891
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## 1509   1.0976283   1.17544467 -0.40904109   1.0211662 -1.0956295   -0.532461395
## 1510   1.0976283   1.17544467 -0.40904109   1.0207348 -1.0956295   -0.357587025
## 1511   1.0976283   1.17544467 -0.40904109   1.0213819 -1.0956295   -0.392561899
## 1512   1.0976283   1.17544467 -0.40904109   1.0211230 -1.0956295   -0.305124714
## 1513   1.0976283   1.17544467 -0.40904109   1.0217270 -1.0931447   -0.514973958
## 1514   1.0976283   1.17544467 -0.40904109   1.0216838 -1.0931447   -0.462511647
## 1515   1.0976283   1.17544467 -0.40904109   1.0214466 -1.0931447   -0.637386017
## 1516   1.0976283   1.17544467 -0.40904109   1.0214897 -1.0931447   -0.322612151
## 1517   1.0976283   1.17544467 -0.40904109   1.0216623 -1.0931447   -0.602411143
## 1518   1.1543562   1.17544467 -0.40904109   1.0213819 -1.0931447   -0.602411143
## 1519   1.1543562   1.17544467 -0.40904109   1.0214681 -1.0931447   -0.882210136
## 1520   1.1543562   1.17544467 -0.40904109   1.0215328 -1.0931447   -0.829747825
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## 1524   1.1543562   1.17544467 -0.40904109   1.0216191 -1.0906600   -0.567436269
## 1525   1.1543562   1.17544467 -0.40904109   1.0219427 -1.0906600   -0.549948832
## 1526   1.1543562   1.17544467 -0.40904109   1.0216623 -1.0906600   -0.654873454
## 1527   1.1543562   1.17544467 -0.40904109   1.0218564 -1.0906600   -0.654873454
## 1528   1.0976283   1.17544467 -0.40904109   1.0218133 -1.0906600   -0.952159884
## 1529   1.0976283   1.17544467 -0.40904109   1.0218780 -1.0906600   -0.724823203
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## 1530   1.0976283   1.17544467 -0.40904109   1.0221368 -1.0906600   -0.742310640
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## 1536   1.0976283   1.17544467 -0.40904109   1.0221152 -1.0881752   -0.759798077
## 1537   1.0976283   1.17544467 -0.40904109   1.0219211 -1.0881752   -0.619898580
## 1538   1.0976283   1.17544467 -0.40904109   1.0216623 -1.0881752   -0.812260388
## 1539   1.0976283   1.17544467 -0.40904109   1.0218780 -1.0881752   -0.672360891
## 1540   1.0976283   1.17544467 -0.40904109   1.0218564 -1.0881752   -0.654873454
## 1541   1.0976283   1.17544467 -0.40904109   1.0218780 -1.0881752   -0.619898580
## 1542   1.0976283   1.17544467 -0.40904109   1.0219427 -1.0881752   -0.654873454
## 1543   1.0976283   1.17544467 -0.40904109   1.0218995 -1.0881752   -0.724823203
## 1544   1.0976283   1.17544467 -0.40904109   1.0219858 -1.0856904   -0.445024210
## 1545   1.0976283   1.17544467 -0.40904109   1.0219643 -1.0856904   -0.357587025
## 1546   1.0976283   1.17544467 -0.40904109   1.0222662 -1.0856904   -0.392561899
## 1547   1.0976283   1.17544467 -0.40904109   1.0219858 -1.0856904   -0.305124714
## 1548   1.0976283   1.17544467 -0.40904109   1.0221152 -1.0856904   -0.375074462
## 1549   1.0976283   1.05106745 -0.40904109   1.0220074 -1.0856904   -0.532461395
## 1550   1.0976283   1.05106745 -0.40904109   1.0220290 -1.0856904   -0.654873454
## 1551   1.0976283   1.05106745 -0.40904109   1.0220937 -1.0856904   -0.637386017
## 1552   1.0976283   1.05106745 -0.40904109   1.0220074 -1.0856904   -0.759798077
## 1553   1.0976283   1.05106745 -0.40904109   1.0222015 -1.0856904   -0.287637277
## 1554   1.0976283   1.05106745 -0.40904109   1.0219643 -1.0832056   -0.602411143
## 1555   1.0976283   1.05106745 -0.40904109   1.0220290 -1.0832056   -0.567436269
## 1556   1.0976283   1.05106745 -0.40904109   1.0220505 -1.0832056   -0.672360891
## 1557   1.0976283   1.05106745 -0.40904109   1.0221584 -1.0832056   -0.497486521
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## 1567   1.0976283   1.05106745 -0.40904109   1.0220721 -1.0807209   -0.549948832
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## 1571   1.0976283   1.17544467 -0.40904109   1.0218564 -1.0807209   -0.130250344
## 1572   1.0976283   1.17544467 -0.40904109   1.0217917 -1.0807209   -0.357587025
## 1573   1.0976283   1.17544467 -0.40904109   1.0220290 -1.0807209   -0.357587025
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## 1580   1.0976283   1.05106745 -0.40904109   1.0219427 -1.0782361   -0.077788032
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## 1582   1.0976283   1.05106745 -0.40904109   1.0222662 -1.0782361   -0.602411143
## 1583   1.0976283   1.05106745 -0.40904109   1.0219643 -1.0782361   -0.567436269
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## 1584 1.0976283 1.05106745 -0.40904109 1.0219427 -1.0757513 -0.794772951
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## 1587 1.0976283 1.05106745 -0.40904109 1.0215760 -1.0757513 -0.200200092
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## 1589 1.0692643 0.92669022 -0.40904109 1.0215976 -1.0757513 -0.130250344
## 1590 1.0692643 0.92669022 -0.40904109 1.0215328 -1.0757513 -0.235174966
## 1591 1.0692643 0.92669022 -0.40904109 1.0207995 -1.0757513  0.044624027
## 1592 1.0692643 0.92669022 -0.40904109 1.0212740 -1.0757513 -0.270149840
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## 1594 1.0692643 0.92669022 -0.40904109 1.0214681 -1.0732665 -0.445024210
## 1595 1.0692643 0.92669022 -0.40904109 1.0217270 -1.0732665 -0.340099588
## 1596 1.0692643 0.92669022 -0.40904109 1.0215976 -1.0732665 -0.392561899
## 1597 1.0692643 0.92669022 -0.40904109 1.0215760 -1.0732665 -0.567436269
## 1598 1.0692643 0.92669022 -0.40904109 1.0217054 -1.0732665 -0.619898580
## 1599 1.0692643 0.92669022 -0.40904109 1.0220074 -1.0732665 -0.549948832
## 1600 1.0692643 0.92669022 -0.40904109 1.0218995 -1.0732665 -0.462511647
## 1601 1.0692643 0.92669022 -0.40904109 1.0218780 -1.0732665 -0.602411143
## 1602 1.0692643 0.92669022 -0.40904109 1.0218133 -1.0732665 -0.619898580
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## 1607 1.0692643 0.92669022 -0.40904109 1.0219643 -1.0707818 -0.462511647
## 1608 1.0692643 0.92669022 -0.40904109 1.0216623 -1.0707818 -0.584923706
## 1609 1.0692643 0.92669022 -0.40904109 1.0217054 -1.0707818 -0.514973958
## 1610 1.0692643 1.05106745 -0.40904109 1.0214897 -1.0707818 -0.060300595
## 1611 1.0692643 1.05106745 -0.40904109 1.0217486 -1.0707818 -0.724823203
## 1612 1.0692643 1.05106745 -0.40904109 1.0214034 -1.0707818 -0.445024210
## 1613 1.0692643 1.05106745 -0.40904109 1.0214466 -1.0707818 -0.514973958
## 1614 1.0692643 1.05106745 -0.40904109 1.0213387 -1.0682970 -0.287637277
## 1615 1.0692643 1.05106745 -0.40904109 1.0213171 -1.0682970 -0.077788032
## 1616 1.0692643 1.05106745 -0.40904109 1.0211014 -1.0682970 -0.322612151
## 1617 1.0692643 1.05106745 -0.40904109 1.0215113 -1.0682970 -0.410049336
## 1618 1.0692643 1.05106745 -0.40904109 1.0215328 -1.0682970 -0.742310640
## 1619 1.0692643 1.05106745 -0.40904109 1.0214250 -1.0682970 -0.305124714
## 1620 1.0692643 1.05106745 -0.40904109 1.0216407 -1.0682970 -0.514973958
## 1621 1.0692643 1.05106745 -0.40904109 1.0216623 -1.0682970 -0.357587025
## 1622 1.0692643 1.05106745 -0.40904109 1.0212956 -1.0682970 -0.462511647
## 1623 1.0692643 1.05106745 -0.40904109 1.0216623 -1.0682970 -0.584923706
## 1624 1.0692643 1.05106745 -0.40904109 1.0216623 -1.0658122 -0.514973958
## 1625 1.0692643 1.05106745 -0.40904109 1.0216623 -1.0658122 -0.410049336
## 1626 1.0692643 1.05106745 -0.40904109 1.0217917 -1.0658122 -0.567436269
## 1627 1.0692643 1.05106745 -0.40904109 1.0215976 -1.0658122 -0.514973958
## 1628 1.0692643 1.05106745 -0.40904109 1.0216623 -1.0658122 -0.742310640
## 1629 1.0692643 1.05106745 -0.40904109 1.0217486 -1.0658122 -0.724823203
## 1630 1.0409003 0.92669022 -0.40904109 1.0216407 -1.0658122 -0.794772951
## 1631 1.0409003 0.92669022 -0.40904109 1.0218133 -1.0658122 -0.847235262
## 1632 1.0409003 0.92669022 -0.40904109 1.0214681 -1.0658122 -0.829747825
## 1633 1.0409003 0.92669022 -0.40904109 1.0217701 -1.0658122 -0.882210136
## 1634 1.0409003 0.92669022 -0.40904109 1.0218780 -1.0633274 -0.689848328
## 1635 1.0409003 0.92669022 -0.40904109 1.0216623 -1.0633274 -0.549948832
## 1636 1.0409003 0.92669022 -0.40904109 1.0213603 -1.0633274 -0.235174966
## 1637 1.0409003 0.92669022 -0.40904109 1.0212309 -1.0633274 -0.112762907
```

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## 1638   1.0409003   0.92669022 -0.40904109   1.0214897 -1.0633274    0.306935582
## 1639   1.0409003   0.92669022 -0.40904109   1.0213171 -1.0633274    0.289448145
## 1640   1.0409003   0.92669022 -0.40904109   1.0214250 -1.0633274    0.394372767
## 1641   1.0409003   0.92669022 -0.40904109   1.0213819 -1.0633274    0.324423019
## 1642   1.0409003   0.92669022 -0.40904109   1.0214466 -1.0633274   -0.357587025
## 1643   1.0409003   0.92669022 -0.40904109   1.0216623 -1.0633274   -0.777285514
## 1644   1.0409003   0.92669022 -0.40904109   1.0217486 -1.0608427   -0.952159884
## 1645   1.0409003   0.92669022 -0.40904109   1.0216838 -1.0608427   -0.742310640
## 1646   1.0409003   0.92669022 -0.40904109   1.0217270 -1.0608427   -0.514973958
## 1647   1.0409003   0.92669022 -0.40904109   1.0216623 -1.0608427   -0.217687529
## 1648   1.0409003   0.92669022 -0.40904109   1.0216407 -1.0608427   -0.392561899
## 1649   1.0409003   0.92669022 -0.40904109   1.0217917 -1.0608427   -0.567436269
## 1650   1.0692643   0.92669022 -0.40904109   1.0216191 -1.0608427   -0.654873454
## 1651   1.0692643   0.92669022 -0.42622005   1.0216407 -1.0608427   -0.445024210
## 1652   1.0692643   0.92669022 -0.42622005   1.0215976 -1.0608427   -0.514973958
## 1653   1.0692643   0.92669022 -0.42622005   1.0215113 -1.0608427   -0.584923706
## 1654   1.0692643   0.92669022 -0.42622005   1.0219427 -1.0583579   -0.637386017
## 1655   1.0692643   0.92669022 -0.42622005   1.0216407 -1.0583579   -0.479999084
## 1656   1.0692643   0.92669022 -0.42622005   1.0216191 -1.0583579   -0.322612151
## 1657   1.0692643   0.92669022 -0.42622005   1.0217270 -1.0583579   -0.777285514
## 1658   1.0692643   0.92669022 -0.42622005   1.0216407 -1.0583579   -0.637386017
## 1659   1.0692643   0.92669022 -0.42622005   1.0213387 -1.0583579   -0.357587025
## 1660   1.0692643   0.92669022 -0.42622005   1.0214681 -1.0583579   -0.200200092
## 1661   1.0692643   0.92669022 -0.42622005   1.0214034 -1.0583579   -0.252662403
## 1662   1.0692643   0.92669022 -0.42622005   1.0214681 -1.0583579   -0.270149840
## 1663   1.0692643   0.92669022 -0.42622005   1.0217486 -1.0583579   -0.165225218
## 1664   1.0692643   0.92669022 -0.42622005   1.0219427 -1.0558731   -0.252662403
## 1665   1.0692643   0.92669022 -0.42622005   1.0218133 -1.0558731   -0.340099588
## 1666   1.0692643   0.92669022 -0.42622005   1.0220290 -1.0558731   -0.340099588
## 1667   1.0692643   0.92669022 -0.42622005   1.0219211 -1.0558731   -0.322612151
## 1668   1.0692643   0.92669022 -0.42622005   1.0221368 -1.0558731   -0.549948832
## 1669   1.0692643   0.92669022 -0.42622005   1.0220074 -1.0558731   -0.567436269
## 1670   1.0409003   0.92669022 -0.42622005   1.0220074 -1.0558731   -0.305124714
## 1671   1.0409003   0.92669022 -0.42622005   1.0218995 -1.0558731   -0.637386017
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## 1673   1.0409003   0.92669022 -0.42622005   1.0218780 -1.0558731   -0.619898580
## 1674   1.0409003   0.92669022 -0.42622005   1.0218780 -1.0558731   -0.619898580
## 1675   1.0409003   0.92669022 -0.42622005   1.0220290 -1.0533883   -0.497486521
## 1676   1.0409003   0.92669022 -0.42622005   1.0217270 -1.0533883   -0.462511647
## 1677   1.0409003   0.92669022 -0.42622005   1.0219427 -1.0533883   -0.410049336
## 1678   1.0409003   0.92669022 -0.42622005   1.0218133 -1.0533883   -0.602411143
## 1679   1.0409003   0.92669022 -0.42622005   1.0220074 -1.0533883   -0.794772951
## 1680   1.0409003   0.92669022 -0.42622005   1.0218780 -1.0533883   -0.270149840
## 1681   1.0409003   1.05106745 -0.42622005   1.0219211 -1.0533883   -0.777285514
## 1682   1.0409003   1.05106745 -0.42622005   1.0219858 -1.0533883   -0.584923706
## 1683   1.0409003   1.05106745 -0.42622005   1.0222447 -1.0533883   -0.427536773
## 1684   1.0409003   1.05106745 -0.42622005   1.0222231 -1.0533883   -0.392561899
## 1685   1.0409003   1.05106745 -0.42622005   1.0221368 -1.0509036   -0.392561899
## 1686   1.0409003   1.05106745 -0.42622005   1.0220290 -1.0509036   -0.497486521
## 1687   1.0409003   1.05106745 -0.42622005   1.0220074 -1.0509036   -0.654873454
## 1688   1.0409003   1.05106745 -0.42622005   1.0219427 -1.0509036   -0.602411143
## 1689   1.0409003   1.05106745 -0.42622005   1.0217701 -1.0509036   -0.514973958
## 1690   1.0409003   1.05106745 -0.42622005   1.0218564 -1.0509036   -0.392561899
## 1691   1.0409003   0.92669022 -0.42622005   1.0220937 -1.0509036   -0.637386017
```

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## 1692   1.0409003   0.92669022  -0.44339902   1.0223094  -1.0509036  -0.637386017
## 1693   1.0409003   0.92669022  -0.44339902   1.0225898  -1.0509036  -0.724823203
## 1694   1.0409003   0.92669022  -0.44339902   1.0225035  -1.0509036  -0.637386017
## 1695   1.0409003   0.92669022  -0.44339902   1.0224819  -1.0484188  -0.742310640
## 1696   1.0409003   0.92669022  -0.44339902   1.0223741  -1.0484188  -0.462511647
## 1697   1.0409003   0.92669022  -0.44339902   1.0223309  -1.0484188  -0.375074462
## 1698   1.0409003   0.92669022  -0.44339902   1.0221152  -1.0484188  -0.392561899
## 1699   1.0409003   0.92669022  -0.44339902   1.0222231  -1.0484188  -0.410049336
## 1700   1.0409003   0.92669022  -0.44339902   1.0221584  -1.0484188  -0.514973958
## 1701   1.0409003   0.92669022  -0.44339902   1.0220937  -1.0484188  -0.514973958
## 1702   1.0409003   0.92669022  -0.44339902   1.0220937  -1.0484188  -0.619898580
## 1703   1.0409003   0.92669022  -0.44339902   1.0221368  -1.0484188  -0.707335766
## 1704   1.0409003   0.92669022  -0.44339902   1.0220290  -1.0484188  -0.165225218
## 1705   1.0409003   0.92669022  -0.44339902   1.0220505  -1.0459340  -0.584923706
## 1706   1.0409003   0.92669022  -0.44339902   1.0221152  -1.0459340  -0.235174966
## 1707   1.0409003   0.92669022  -0.44339902   1.0221368  -1.0459340  -0.287637277
## 1708   1.0409003   0.92669022  -0.44339902   1.0222231  -1.0459340   0.027136590
## 1709   1.0409003   0.92669022  -0.44339902   1.0220074  -1.0459340  -0.270149840
## 1710   1.0409003   0.92669022  -0.44339902   1.0221368  -1.0459340  -0.357587025
## 1711   1.0125363   0.80231300  -0.44339902   1.0219858  -1.0459340  -0.375074462
## 1712   1.0125363   0.80231300  -0.44339902   1.0220074  -1.0459340  -0.112762907
## 1713   1.0125363   0.80231300  -0.44339902   1.0221584  -1.0459340  -0.287637277
## 1714   1.0125363   0.80231300  -0.44339902   1.0224388  -1.0459340  -0.182712655
## 1715   1.0125363   0.80231300  -0.44339902   1.0223957  -1.0434492  -0.392561899
## 1716   1.0125363   0.80231300  -0.44339902   1.0218995  -1.0434492  -0.165225218
## 1717   1.0125363   0.80231300  -0.44339902   1.0221584  -1.0434492  -0.217687529
## 1718   1.0125363   0.80231300  -0.44339902   1.0221368  -1.0434492  -0.007838284
## 1719   1.0125363   0.80231300  -0.44339902   1.0215760  -1.0434492  -0.235174966
## 1720   1.0125363   0.80231300  -0.44339902   1.0215760  -1.0434492  -0.322612151
## 1721   1.0125363   0.80231300  -0.44339902   1.0215544  -1.0434492  -0.182712655
## 1722   1.0125363   0.80231300  -0.44339902   1.0219858  -1.0434492   0.027136590
## 1723   1.0125363   0.80231300  -0.44339902   1.0217486  -1.0434492  -0.007838284
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## 1725   1.0125363   0.80231300  -0.44339902   1.0216838  -1.0409645   0.289448145
## 1726   1.0125363   0.80231300  -0.44339902   1.0217701  -1.0409645  -0.025325721
## 1727   1.0125363   0.80231300  -0.44339902   1.0216407  -1.0409645  -0.375074462
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## 1731   1.0125363   0.80231300  -0.44339902   1.0215976  -1.0409645  -0.112762907
## 1732   1.0125363   0.80231300  -0.46057798   1.0217486  -1.0409645  -0.095275469
## 1733   1.0125363   0.80231300  -0.46057798   1.0218133  -1.0409645  -0.112762907
## 1734   1.0125363   0.80231300  -0.46057798   1.0217486  -1.0384797  -0.602411143
## 1735   1.0125363   0.80231300  -0.46057798   1.0218780  -1.0384797  -0.462511647
## 1736   1.0125363   0.80231300  -0.46057798   1.0221584  -1.0384797  -0.479999084
## 1737   1.0125363   0.80231300  -0.46057798   1.0220290  -1.0384797  -0.654873454
## 1738   1.0125363   0.80231300  -0.46057798   1.0220290  -1.0384797  -0.882210136
## 1739   1.0125363   0.80231300  -0.46057798   1.0219858  -1.0384797  -0.777285514
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## 1741   1.0125363   0.67793578  -0.46057798   1.0219643  -1.0384797  -0.707335766
## 1742   1.0125363   0.67793578  -0.46057798   1.0220937  -1.0384797  -0.829747825
## 1743   1.0125363   0.67793578  -0.46057798   1.0218995  -1.0384797  -0.427536773
## 1744   0.9274444   0.42918133  -0.49493590   1.0218995  -0.9937537  -0.182712655
## 1745   0.9274444   0.42918133  -0.49493590   1.0214897  -0.9912690  -0.427536773
```

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## 1746   0.9274444   0.42918133 -0.49493590   1.0216838 -0.9912690   -0.165225218
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## 1748   0.9274444   0.42918133 -0.49493590   1.0217486 -0.9912690   -0.410049336
## 1749   0.9274444   0.42918133 -0.49493590   1.0214466 -0.9912690    0.044624027
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## 1751   0.9274444   0.42918133 -0.49493590   1.0216407 -0.9912690   -0.462511647
## 1752   0.9274444   0.42918133 -0.49493590   1.0217270 -0.9912690   -0.340099588
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## 1754   0.9558084   0.42918133 -0.49493590   1.0215113 -0.9912690   -0.217687529
## 1755   0.9558084   0.42918133 -0.49493590   1.0213171 -0.9887842   -0.112762907
## 1756   0.9558084   0.42918133 -0.49493590   1.0213171 -0.9887842   -0.182712655
## 1757   0.9558084   0.42918133 -0.49493590   1.0214250 -0.9887842   -0.112762907
## 1758   0.9558084   0.42918133 -0.49493590   1.0214897 -0.9887842   -0.165225218
## 1759   0.9558084   0.42918133 -0.49493590   1.0214897 -0.9887842   -0.217687529
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## 1763   0.9274444   0.30480411 -0.49493590   1.0218780 -0.9887842   -0.357587025
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## 1766   0.9274444   0.30480411 -0.49493590   1.0214897 -0.9862994   -0.672360891
## 1767   0.9274444   0.30480411 -0.49493590   1.0214466 -0.9862994   -0.532461395
## 1768   0.9274444   0.30480411 -0.49493590   1.0214681 -0.9862994   -0.689848328
## 1769   0.9274444   0.30480411 -0.49493590   1.0217917 -0.9862994   -0.812260388
## 1770   0.9274444   0.30480411 -0.49493590   1.0216838 -0.9862994   -0.567436269
## 1771   0.9274444   0.30480411 -0.49493590   1.0217701 -0.9862994   -0.462511647
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## 1775   0.9274444   0.42918133 -0.51211486   1.0212309 -0.9838146   -0.270149840
## 1776   0.9274444   0.42918133 -0.51211486   1.0215328 -0.9838146   -0.392561899
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## 1778   0.9274444   0.42918133 -0.51211486   1.0215976 -0.9838146   -0.427536773
## 1779   0.9274444   0.42918133 -0.51211486   1.0217486 -0.9838146   -0.322612151
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## 1782   0.9274444   0.42918133 -0.51211486   1.0214681 -0.9838146   -0.340099588
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## 1788   0.9274444   0.30480411 -0.51211486   1.0215544 -0.9813299   -0.165225218
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## 1790   0.9274444   0.30480411 -0.51211486   1.0217701 -0.9813299   -0.479999084
## 1791   0.9274444   0.30480411 -0.51211486   1.0217270 -0.9813299   -0.392561899
## 1792   0.9274444   0.30480411 -0.51211486   1.0216191 -0.9813299   -0.392561899
## 1793   0.9558084   0.42918133 -0.51211486   1.0215328 -0.9813299   -0.602411143
## 1794   0.9558084   0.42918133 -0.51211486   1.0216191 -0.9813299   -0.637386017
## 1795   0.9558084   0.42918133 -0.51211486   1.0215328 -0.9788451   -0.724823203
## 1796   0.9558084   0.42918133 -0.51211486   1.0211014 -0.9788451   -0.794772951
## 1797   0.9558084   0.42918133 -0.51211486   1.0215113 -0.9788451   -0.654873454
## 1798   0.9558084   0.42918133 -0.51211486   1.0216191 -0.9788451   -0.707335766
## 1799   0.9558084   0.42918133 -0.51211486   1.0215544 -0.9788451   -0.619898580
```

```
## 1800   0.9558084   0.42918133 -0.51211486   1.0215976 -0.9788451  -0.619898580
## 1801   0.9558084   0.42918133 -0.51211486   1.0213819 -0.9788451  -0.532461395
## 1802   0.9558084   0.42918133 -0.51211486   1.0214897 -0.9788451  -0.707335766
## 1803   0.9274444   0.42918133 -0.51211486   1.0213387 -0.9788451  -0.375074462
## 1804   0.9274444   0.42918133 -0.51211486   1.0212309 -0.9788451  -0.217687529
## 1805   0.9274444   0.42918133 -0.51211486   1.0213171 -0.9763603  -0.375074462
## 1806   0.9274444   0.42918133 -0.51211486   1.0217270 -0.9763603  -0.479999084
## 1807   0.9274444   0.42918133 -0.51211486   1.0214681 -0.9763603  -0.584923706
## 1808   0.9274444   0.42918133 -0.51211486   1.0217270 -0.9763603  -0.549948832
## 1809   0.9274444   0.42918133 -0.51211486   1.0217054 -0.9763603  -0.724823203
## 1810   0.9274444   0.42918133 -0.51211486   1.0216838 -0.9763603  -0.689848328
## 1811   0.9274444   0.42918133 -0.51211486   1.0215544 -0.9763603  -0.497486521
## 1812   0.9274444   0.42918133 -0.51211486   1.0212524 -0.9763603  -0.270149840
## 1813   0.9274444   0.42918133 -0.51211486   1.0210152 -0.9763603  -0.165225218
## 1814   0.9274444   0.42918133 -0.51211486   1.0212093 -0.9738755   0.167036086
## 1815   0.9274444   0.42918133 -0.51211486   1.0213819 -0.9738755  -0.305124714
## 1816   0.9274444   0.42918133 -0.51211486   1.0215328 -0.9738755  -0.182712655
## 1817   0.9274444   0.42918133 -0.51211486   1.0211446 -0.9738755   0.481809953
## 1818   0.9274444   0.42918133 -0.51211486   1.0214466 -0.9738755  -0.060300595
## 1819   0.9274444   0.42918133 -0.51211486   1.0214897 -0.9738755  -0.252662403
## 1820   0.9274444   0.42918133 -0.51211486   1.0212956 -0.9738755  -0.322612151
## 1821   0.9274444   0.42918133 -0.51211486   1.0214466 -0.9738755  -0.410049336
## 1822   0.9274444   0.42918133 -0.51211486   1.0211446 -0.9738755  -0.252662403
## 1823   0.9274444   0.42918133 -0.51211486   1.0211877 -0.9738755  -0.392561899
## 1824   0.9274444   0.42918133 -0.51211486   1.0212740 -0.9713908   0.167036086
## 1825   0.9274444   0.42918133 -0.51211486   1.0211662 -0.9713908   0.184523523
## 1826   0.9274444   0.42918133 -0.51211486   1.0211014 -0.9713908   0.167036086
## 1827   0.9274444   0.42918133 -0.51211486   1.0211662 -0.9713908   0.114573775
## 1828   0.9274444   0.42918133 -0.51211486   1.0211014 -0.9713908  -0.007838284
## 1829   0.9274444   0.42918133 -0.51211486   1.0212093 -0.9713908  -0.007838284
## 1830   0.9274444   0.42918133 -0.51211486   1.0213171 -0.9713908  -0.112762907
## 1831   0.9274444   0.42918133 -0.51211486   1.0214897 -0.9713908  -0.165225218
## 1832   0.9274444   0.42918133 -0.51211486   1.0215113 -0.9713908  -0.147737781
## 1833   0.9558084   0.42918133 -0.51211486   1.0215328 -0.9713908  -0.060300595
## 1834   0.9558084   0.42918133 -0.51211486   1.0217270 -0.9689060   0.079598901
## 1835   0.9558084   0.42918133 -0.51211486   1.0216407 -0.9689060   0.097086338
## 1836   0.9558084   0.42918133 -0.51211486   1.0218564 -0.9689060   0.044624027
## 1837   0.9558084   0.42918133 -0.51211486   1.0220505 -0.9689060  -0.147737781
## 1838   0.9558084   0.42918133 -0.51211486   1.0219427 -0.9689060  -0.305124714
## 1839   0.9558084   0.42918133 -0.51211486   1.0219427 -0.9689060  -0.235174966
## 1840   0.9558084   0.42918133 -0.51211486   1.0220505 -0.9689060  -0.077788032
## 1841   0.9558084   0.42918133 -0.51211486   1.0219427 -0.9689060   0.044624027
## 1842   0.9558084   0.42918133 -0.52929383   1.0218995 -0.9689060  -0.479999084
## 1843   0.9274444   0.42918133 -0.52929383   1.0218995 -0.9689060  -0.305124714
## 1844   0.9274444   0.42918133 -0.52929383   1.0217486 -0.9664212  -0.445024210
## 1845   0.9274444   0.42918133 -0.52929383   1.0220721 -0.9664212  -0.182712655
## 1846   0.9274444   0.42918133 -0.52929383   1.0219427 -0.9664212  -0.165225218
## 1847   0.9274444   0.42918133 -0.52929383   1.0219427 -0.9664212  -0.252662403
## 1848   0.9274444   0.42918133 -0.52929383   1.0217917 -0.9664212  -0.217687529
## 1849   0.9274444   0.42918133 -0.52929383   1.0218133 -0.9664212  -0.147737781
## 1850   0.9274444   0.42918133 -0.52929383   1.0220290 -0.9664212  -0.147737781
## 1851   0.9274444   0.42918133 -0.52929383   1.0220721 -0.9664212  -0.375074462
## 1852   0.9274444   0.42918133 -0.52929383   1.0219643 -0.9664212  -0.497486521
## 1853   0.9274444   0.30480411 -0.52929383   1.0219858 -0.9664212  -0.672360891
```

```
## 1854  0.9274444  0.30480411 -0.52929383  1.0220290 -0.9639364  -0.882210136
## 1855  0.9274444  0.30480411 -0.52929383  1.0221800 -0.9639364  -0.812260388
## 1856  0.9274444  0.30480411 -0.52929383  1.0223094 -0.9639364  -0.882210136
## 1857  0.9274444  0.30480411 -0.52929383  1.0221152 -0.9639364  -0.864722699
## 1858  0.9274444  0.30480411 -0.52929383  1.0222015 -0.9639364  -1.004622195
## 1859  0.9274444  0.30480411 -0.52929383  1.0223309 -0.9639364  -0.829747825
## 1860  0.9274444  0.30480411 -0.52929383  1.0221584 -0.9639364  -0.602411143
## 1861  0.9274444  0.30480411 -0.52929383  1.0219858 -0.9639364  -0.707335766
## 1862  0.9274444  0.30480411 -0.54647279  1.0218348 -0.9639364  -0.759798077
## 1863  0.8990804  0.30480411 -0.54647279  1.0218995 -0.9639364  -0.602411143
## 1864  0.8990804  0.30480411 -0.54647279  1.0218995 -0.9614517  -0.427536773
## 1865  0.8990804  0.30480411 -0.54647279  1.0220290 -0.9614517  -0.375074462
## 1866  0.8990804  0.30480411 -0.54647279  1.0221152 -0.9614517  -0.497486521
## 1867  0.8990804  0.30480411 -0.54647279  1.0221584 -0.9614517  -0.654873454
## 1868  0.8990804  0.30480411 -0.54647279  1.0221368 -0.9614517  -0.549948832
## 1869  0.8990804  0.30480411 -0.54647279  1.0220937 -0.9614517  -0.479999084
## 1870  0.8990804  0.30480411 -0.54647279  1.0220937 -0.9614517  -0.479999084
## 1871  0.8990804  0.30480411 -0.54647279  1.0221152 -0.9614517  -0.445024210
## 1872  0.8990804  0.30480411 -0.54647279  1.0221368 -0.9614517  -0.672360891
## 1873  0.9274444  0.30480411 -0.54647279  1.0222015 -0.9614517  -0.305124714
## 1874  0.9274444  0.30480411 -0.54647279  1.0220290 -0.9589669  -0.445024210
## 1875  0.9274444  0.30480411 -0.54647279  1.0221368 -0.9589669  -0.707335766
## 1876  0.9274444  0.30480411 -0.54647279  1.0221800 -0.9589669  -0.549948832
## 1877  0.9274444  0.30480411 -0.54647279  1.0221152 -0.9589669  -0.462511647
## 1878  0.9274444  0.30480411 -0.54647279  1.0223309 -0.9589669  -0.777285514
## 1879  0.9274444  0.30480411 -0.54647279  1.0221368 -0.9589669  -0.479999084
## 1880  0.9274444  0.30480411 -0.54647279  1.0223957 -0.9589669  -0.584923706
## 1881  0.9274444  0.30480411 -0.54647279  1.0223094 -0.9589669  -0.637386017
## 1882  0.9274444  0.30480411 -0.54647279  1.0222662 -0.9589669  -0.375074462
## 1883  0.9274444  0.30480411 -0.54647279  1.0223309 -0.9589669  -0.340099588
## 1884  0.9274444  0.30480411 -0.54647279  1.0220505 -0.9564821  -0.445024210
## 1885  0.9274444  0.30480411 -0.54647279  1.0222447 -0.9564821  -0.742310640
## 1886  0.9274444  0.30480411 -0.54647279  1.0221152 -0.9564821  -0.479999084
## 1887  0.9274444  0.30480411 -0.54647279  1.0221800 -0.9564821  -0.584923706
## 1888  0.9274444  0.30480411 -0.54647279  1.0221800 -0.9564821  -0.532461395
## 1889  0.9274444  0.30480411 -0.54647279  1.0221584 -0.9564821  -0.602411143
## 1890  0.9274444  0.30480411 -0.54647279  1.0220721 -0.9564821  -0.602411143
## 1891  0.9274444  0.30480411 -0.54647279  1.0221152 -0.9564821  -0.392561899
## 1892  0.9274444  0.30480411 -0.54647279  1.0220290 -0.9564821  -0.445024210
## 1893  0.9274444  0.18042688 -0.54647279  1.0220937 -0.9564821  -0.200200092
## 1894  0.9274444  0.18042688 -0.54647279  1.0222015 -0.9539973  -0.602411143
## 1895  0.9274444  0.18042688 -0.54647279  1.0222231 -0.9539973  -0.410049336
## 1896  0.9274444  0.18042688 -0.54647279  1.0223309 -0.9539973  -0.130250344
## 1897  0.9274444  0.18042688 -0.54647279  1.0221800 -0.9539973  -0.462511647
## 1898  0.9274444  0.18042688 -0.54647279  1.0223309 -0.9539973  -0.305124714
## 1899  0.9274444  0.18042688 -0.54647279  1.0222878 -0.9539973  -0.340099588
## 1900  0.9274444  0.18042688 -0.54647279  1.0222662 -0.9539973  -0.410049336
## 1901  0.9274444  0.18042688 -0.54647279  1.0222878 -0.9539973  -0.182712655
## 1902  0.9274444  0.18042688 -0.54647279  1.0219643 -0.9539973  -0.392561899
## 1903  0.8990804  0.18042688 -0.54647279  1.0222231 -0.9539973  -0.532461395
## 1904  0.8990804  0.18042688 -0.54647279  1.0221152 -0.9515126  -0.130250344
## 1905  0.8990804  0.18042688 -0.54647279  1.0222447 -0.9515126  -0.165225218
## 1906  0.8990804  0.18042688 -0.54647279  1.0221152 -0.9515126  -0.077788032
## 1907  0.8990804  0.18042688 -0.54647279  1.0220937 -0.9515126  -0.287637277
```

```
## 1908   0.8990804   0.18042688 -0.54647279   1.0219211 -0.9515126  -0.497486521
## 1909   0.8990804   0.18042688 -0.54647279   1.0219643 -0.9515126  -0.305124714
## 1910   0.8990804   0.18042688 -0.54647279   1.0220074 -0.9515126  -0.462511647
## 1911   0.8990804   0.18042688 -0.54647279   1.0219858 -0.9515126  -0.287637277
## 1912   0.8990804   0.18042688 -0.54647279   1.0218995 -0.9515126  -0.182712655
## 1913   0.8990804   0.18042688 -0.54647279   1.0220074 -0.9515126  -0.130250344
## 1914   0.8990804   0.18042688 -0.54647279   1.0218995 -0.9490278  -0.182712655
## 1915   0.8990804   0.18042688 -0.54647279   1.0220721 -0.9490278  -0.095275469
## 1916   0.8990804   0.18042688 -0.54647279   1.0219858 -0.9490278  -0.322612151
## 1917   0.8990804   0.18042688 -0.54647279   1.0218780 -0.9490278  -0.060300595
## 1918   0.8990804   0.18042688 -0.54647279   1.0220505 -0.9490278  -0.060300595
## 1919   0.8990804   0.18042688 -0.54647279   1.0221368 -0.9490278  -0.112762907
## 1920   0.8990804   0.18042688 -0.54647279   1.0218780 -0.9490278  -0.042813158
## 1921   0.8990804   0.18042688 -0.54647279   1.0219427 -0.9490278  -0.340099588
## 1922   0.8990804   0.18042688 -0.54647279   1.0220721 -0.9490278   0.079598901
## 1923   0.8990804   0.30480411 -0.54647279   1.0216407 -0.9490278   0.097086338
## 1924   0.8990804   0.30480411 -0.54647279   1.0218133 -0.9465430  -0.060300595
## 1925   0.8990804   0.30480411 -0.54647279   1.0216838 -0.9465430  -0.235174966
## 1926   0.8990804   0.30480411 -0.54647279   1.0218564 -0.9465430   0.062111464
## 1927   0.8990804   0.30480411 -0.54647279   1.0218133 -0.9465430   0.132061212
## 1928   0.8990804   0.30480411 -0.54647279   1.0217701 -0.9465430  -0.112762907
## 1929   0.8990804   0.30480411 -0.54647279   1.0217270 -0.9465430  -0.462511647
## 1930   0.8990804   0.30480411 -0.54647279   1.0219643 -0.9465430   0.202010960
## 1931   0.8990804   0.30480411 -0.54647279   1.0218133 -0.9465430  -0.165225218
## 1932   0.8990804   0.30480411 -0.54647279   1.0217270 -0.9465430  -0.445024210
## 1933   0.8990804   0.30480411 -0.54647279   1.0214681 -0.9465430  -0.007838284
## 1934   0.8990804   0.30480411 -0.54647279   1.0212093 -0.9440583   0.097086338
## 1935   0.8990804   0.30480411 -0.54647279   1.0212740 -0.9440583   0.027136590
## 1936   0.8990804   0.30480411 -0.54647279   1.0214466 -0.9440583  -0.007838284
## 1937   0.8990804   0.30480411 -0.54647279   1.0213171 -0.9440583  -0.147737781
## 1938   0.8990804   0.30480411 -0.54647279   1.0214250 -0.9440583  -0.095275469
## 1939   0.8990804   0.30480411 -0.54647279   1.0211446 -0.9440583  -0.007838284
## 1940   0.8990804   0.30480411 -0.54647279   1.0209720 -0.9440583   0.446835078
## 1941   0.8990804   0.30480411 -0.54647279   1.0211877 -0.9440583   0.359397893
## 1942   0.8990804   0.30480411 -0.54647279   1.0214466 -0.9440583  -0.095275469
## 1943   0.8990804   0.18042688 -0.54647279   1.0213387 -0.9440583   0.132061212
## 1944   0.8990804   0.18042688 -0.54647279   1.0211014 -0.9415735  -0.025325721
## 1945   0.8990804   0.18042688 -0.54647279   1.0212740 -0.9415735  -0.287637277
## 1946   0.8990804   0.18042688 -0.54647279   1.0209720 -0.9415735   0.062111464
## 1947   0.8990804   0.18042688 -0.54647279   1.0211877 -0.9415735  -0.200200092
## 1948   0.8990804   0.18042688 -0.54647279   1.0211230 -0.9415735   0.167036086
## 1949   0.8990804   0.18042688 -0.54647279   1.0208426 -0.9415735   0.219498397
## 1950   0.8990804   0.18042688 -0.54647279   1.0209073 -0.9415735   0.149548649
## 1951   0.8990804   0.18042688 -0.56365175   1.0209936 -0.9415735  -0.340099588
## 1952   0.8990804   0.18042688 -0.56365175   1.0211446 -0.9415735   0.114573775
## 1953   0.8990804   0.18042688 -0.56365175   1.0210799 -0.9390887   0.097086338
## 1954   0.8990804   0.18042688 -0.56365175   1.0208857 -0.9390887  -0.112762907
## 1955   0.8990804   0.18042688 -0.56365175   1.0210583 -0.9390887   0.079598901
## 1956   0.8990804   0.18042688 -0.56365175   1.0211446 -0.9390887   0.114573775
## 1957   0.8990804   0.18042688 -0.56365175   1.0214250 -0.9390887   0.167036086
## 1958   0.8990804   0.18042688 -0.56365175   1.0209289 -0.9390887   0.079598901
## 1959   0.8990804   0.18042688 -0.56365175   1.0206053 -0.9390887   0.271960708
## 1960   0.8990804   0.18042688 -0.56365175   1.0213819 -0.9390887   0.044624027
## 1961   0.8990804   0.18042688 -0.56365175   1.0210152 -0.9390887  -0.200200092
```

```
## 1962   0.8990804   0.18042688 -0.56365175   1.0207779 -0.9390887   -0.095275469
## 1963   0.8990804   0.18042688 -0.56365175   1.0209936 -0.9366039   -0.042813158
## 1964   0.8990804   0.18042688 -0.56365175   1.0211014 -0.9366039   -0.340099588
## 1965   0.8990804   0.18042688 -0.56365175   1.0211877 -0.9366039   -0.619898580
## 1966   0.8990804   0.18042688 -0.56365175   1.0211877 -0.9366039   -0.532461395
## 1967   0.8990804   0.18042688 -0.56365175   1.0212309 -0.9366039   -0.322612151
## 1968   0.8990804   0.18042688 -0.56365175   1.0213171 -0.9366039   -0.427536773
## 1969   0.8990804   0.18042688 -0.56365175   1.0209720 -0.9366039   -0.340099588
## 1970   0.8990804   0.18042688 -0.56365175   1.0210799 -0.9366039   -0.095275469
## 1971   0.8990804   0.18042688 -0.56365175   1.0209720 -0.9366039   -0.130250344
## 1972   0.8990804   0.18042688 -0.56365175   1.0213171 -0.9366039   -0.060300595
## 1973   0.8990804   0.18042688 -0.56365175   1.0212956 -0.9341192   -0.305124714
## 1974   0.8990804   0.18042688 -0.56365175   1.0211446 -0.9341192   -0.182712655
## 1975   0.8990804   0.18042688 -0.56365175   1.0213171 -0.9341192   -0.112762907
## 1976   0.8990804   0.18042688 -0.56365175   1.0213819 -0.9341192   -0.322612151
## 1977   0.8990804   0.18042688 -0.56365175   1.0210799 -0.9341192    0.062111464
## 1978   0.8990804   0.18042688 -0.56365175   1.0209936 -0.9341192   -0.112762907
## 1979   0.8990804   0.18042688 -0.56365175   1.0212740 -0.9341192   -0.340099588
## 1980   0.8990804   0.18042688 -0.56365175   1.0211877 -0.9341192   -0.182712655
## 1981   0.8990804   0.18042688 -0.56365175   1.0213171 -0.9341192   -0.252662403
## 1982   0.8990804   0.18042688 -0.56365175   1.0212740 -0.9341192   -0.462511647
## 1983   0.8990804   0.18042688 -0.56365175   1.0214250 -0.9316344   -0.322612151
## 1984   0.8990804   0.18042688 -0.56365175   1.0212093 -0.9316344   -0.270149840
## 1985   0.8990804   0.18042688 -0.56365175   1.0214897 -0.9316344   -0.182712655
## 1986   0.8990804   0.18042688 -0.56365175   1.0213819 -0.9316344   -0.200200092
## 1987   0.8990804   0.18042688 -0.56365175   1.0214897 -0.9316344   -0.095275469
## 1988   0.8990804   0.18042688 -0.56365175   1.0214034 -0.9316344   -0.077788032
## 1989   0.8990804   0.18042688 -0.56365175   1.0216838 -0.9316344   -0.060300595
## 1990   0.8990804   0.18042688 -0.56365175   1.0216407 -0.9316344    0.027136590
## 1991   0.8990804   0.18042688 -0.56365175   1.0218348 -0.9316344    0.394372767
## 1992   0.8990804   0.18042688 -0.56365175   1.0216407 -0.9316344    0.114573775
## 1993   0.8707164   0.18042688 -0.56365175   1.0217701 -0.9291496    0.167036086
## 1994   0.8707164   0.18042688 -0.56365175   1.0217270 -0.9291496   -0.305124714
## 1995   0.8707164   0.18042688 -0.56365175   1.0216838 -0.9291496   -0.077788032
## 1996   0.8707164   0.18042688 -0.56365175   1.0217270 -0.9291496   -0.165225218
## 1997   0.8707164   0.18042688 -0.56365175   1.0216838 -0.9291496    0.009649153
## 1998   0.8707164   0.18042688 -0.56365175   1.0218780 -0.9291496    0.097086338
## 1999   0.8707164   0.18042688 -0.56365175   1.0218564 -0.9291496   -0.060300595
## 2000   0.8707164   0.18042688 -0.56365175   1.0217917 -0.9291496   -0.217687529
## 2001   0.8707164   0.18042688 -0.56365175   1.0217486 -0.9291496    0.044624027
## 2002   0.8707164   0.18042688 -0.56365175   1.0217701 -0.9291496    0.027136590
## 2003   0.8990804   0.30480411 -0.56365175   1.0218348 -0.9266648   -0.165225218
## 2004   0.8990804   0.30480411 -0.56365175   1.0219211 -0.9266648   -0.095275469
## 2005   0.8990804   0.30480411 -0.56365175   1.0218348 -0.9266648   -0.497486521
## 2006   0.8990804   0.30480411 -0.56365175   1.0219643 -0.9266648    0.079598901
## 2007   0.8990804   0.30480411 -0.56365175   1.0217270 -0.9266648   -0.217687529
## 2008   0.8990804   0.30480411 -0.56365175   1.0219427 -0.9266648   -0.182712655
## 2009   0.8990804   0.30480411 -0.56365175   1.0219427 -0.9266648   -0.060300595
## 2010   0.8990804   0.30480411 -0.58083071   1.0217054 -0.9266648   -0.130250344
## 2011   0.8990804   0.30480411 -0.58083071   1.0217701 -0.9266648   -0.287637277
## 2012   0.8990804   0.30480411 -0.58083071   1.0216838 -0.9266648   -0.112762907
## 2013   0.8990804   0.05604966 -0.58083071   1.0215544 -0.9241801    0.202010960
## 2014   0.8990804   0.05604966 -0.58083071   1.0215760 -0.9241801   -0.235174966
## 2015   0.8990804   0.05604966 -0.58083071   1.0217054 -0.9241801   -0.147737781
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## 2016   0.8990804  0.05604966 -0.58083071   1.0218780 -0.9241801   0.097086338
## 2017   0.8990804  0.05604966 -0.58083071   1.0217270 -0.9241801   0.132061212
## 2018   0.8990804  0.05604966 -0.58083071   1.0220505 -0.9241801   0.149548649
## 2019   0.8990804  0.05604966 -0.58083071   1.0218348 -0.9241801  -0.077788032
## 2020   0.8990804  0.05604966 -0.58083071   1.0219643 -0.9241801  -0.235174966
## 2021   0.8990804  0.05604966 -0.58083071   1.0218995 -0.9241801  -0.060300595
## 2022   0.8990804  0.05604966 -0.58083071   1.0219858 -0.9241801   0.167036086
## 2023   0.8707164  0.18042688 -0.58083071   1.0217486 -0.9216953   0.114573775
## 2024   0.8707164  0.18042688 -0.58083071   1.0218133 -0.9216953   0.411860204
## 2025   0.8707164  0.18042688 -0.58083071   1.0217270 -0.9216953   0.289448145
## 2026   0.8707164  0.18042688 -0.58083071   1.0218348 -0.9216953   0.271960708
## 2027   0.8707164  0.18042688 -0.58083071   1.0217270 -0.9216953   0.219498397
## 2028   0.8707164  0.18042688 -0.58083071   1.0217486 -0.9216953   0.394372767
## 2029   0.8707164  0.18042688 -0.58083071   1.0217486 -0.9216953   0.009649153
## 2030   0.8707164  0.18042688 -0.58083071   1.0214897 -0.9216953   0.062111464
## 2031   0.8707164  0.18042688 -0.58083071   1.0216191 -0.9216953   0.149548649
## 2032   0.8707164  0.18042688 -0.58083071   1.0214681 -0.9216953   0.097086338
## 2033   0.8423524  0.18042688 -0.58083071   1.0215544 -0.9192105  -0.130250344
## 2034   0.8423524  0.18042688 -0.58083071   1.0214897 -0.9192105   0.114573775
## 2035   0.8423524  0.18042688 -0.58083071   1.0216407 -0.9192105  -0.165225218
## 2036   0.8423524  0.18042688 -0.58083071   1.0217270 -0.9192105   0.044624027
## 2037   0.8423524  0.18042688 -0.58083071   1.0217270 -0.9192105   0.009649153
## 2038   0.8423524  0.18042688 -0.58083071   1.0214897 -0.9192105  -0.252662403
## 2039   0.8423524  0.18042688 -0.58083071   1.0216407 -0.9192105   0.132061212
## 2040   0.8423524  0.18042688 -0.58083071   1.0217270 -0.9192105  -0.025325721
## 2041   0.8423524  0.18042688 -0.58083071   1.0220505 -0.9192105   0.062111464
## 2042   0.8423524  0.18042688 -0.58083071   1.0218133 -0.9192105   0.009649153
## 2043   0.8990804  0.05604966 -0.58083071   1.0218780 -0.9167257  -0.357587025
## 2044   0.8990804  0.05604966 -0.58083071   1.0217701 -0.9167257  -0.200200092
## 2045   0.8990804  0.05604966 -0.58083071   1.0217486 -0.9167257  -0.182712655
## 2046   0.8990804  0.05604966 -0.58083071   1.0216838 -0.9167257  -0.602411143
## 2047   0.8990804  0.05604966 -0.58083071   1.0217486 -0.9167257  -0.532461395
## 2048   0.8990804  0.05604966 -0.58083071   1.0219211 -0.9167257  -0.182712655
## 2049   0.8990804  0.05604966 -0.58083071   1.0220074 -0.9167257  -0.462511647
## 2050   0.8990804  0.05604966 -0.59800968   1.0218348 -0.9167257  -0.672360891
## 2051   0.8990804  0.05604966 -0.59800968   1.0217917 -0.9167257  -0.532461395
## 2052   0.8990804  0.05604966 -0.59800968   1.0216623 -0.9167257  -0.567436269
## 2053   0.8707164  0.05604966 -0.59800968   1.0215544 -0.9142410   0.009649153
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## 2055   0.8707164  0.05604966 -0.59800968   1.0217486 -0.9142410  -0.392561899
## 2056   0.8707164  0.05604966 -0.59800968   1.0215544 -0.9142410  -0.165225218
## 2057   0.8707164  0.05604966 -0.59800968   1.0218780 -0.9142410  -0.165225218
## 2058   0.8707164  0.05604966 -0.59800968   1.0217054 -0.9142410  -0.095275469
## 2059   0.8707164  0.05604966 -0.59800968   1.0218348 -0.9142410  -0.235174966
## 2060   0.8707164  0.05604966 -0.59800968   1.0218564 -0.9142410  -0.147737781
## 2061   0.8707164  0.05604966 -0.59800968   1.0217270 -0.9142410  -0.165225218
## 2062   0.8707164  0.05604966 -0.59800968   1.0218780 -0.9142410  -0.287637277
## 2063   0.8707164  0.18042688 -0.59800968   1.0219211 -0.9117562  -0.462511647
## 2064   0.8707164  0.18042688 -0.59800968   1.0218348 -0.9117562   0.079598901
## 2065   0.8707164  0.18042688 -0.59800968   1.0217054 -0.9117562  -0.305124714
## 2066   0.8707164  0.18042688 -0.59800968   1.0218133 -0.9117562   0.079598901
## 2067   0.8707164  0.18042688 -0.59800968   1.0217270 -0.9117562  -0.182712655
## 2068   0.8707164  0.18042688 -0.59800968   1.0218995 -0.9117562   0.062111464
## 2069   0.8707164  0.18042688 -0.59800968   1.0217486 -0.9117562   0.184523523
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## 2070   0.8707164   0.18042688  -0.59800968   1.0217270 -0.9117562    0.254473271
## 2071   0.8707164   0.18042688  -0.59800968   1.0216838 -0.9117562    0.306935582
## 2072   0.8707164   0.18042688  -0.59800968   1.0216191 -0.9117562    0.691659197
## 2073   0.8707164   0.18042688  -0.59800968   1.0218564 -0.9092714    0.306935582
## 2074   0.8707164   0.18042688  -0.59800968   1.0217917 -0.9092714   -0.007838284
## 2075   0.8707164   0.18042688  -0.59800968   1.0218780 -0.9092714    0.202010960
## 2076   0.8707164   0.18042688  -0.59800968   1.0220505 -0.9092714   -0.130250344
## 2077   0.8707164   0.18042688  -0.59800968   1.0217486 -0.9092714    0.009649153
## 2078   0.8707164   0.18042688  -0.59800968   1.0220074 -0.9092714   -0.007838284
## 2079   0.8707164   0.18042688  -0.59800968   1.0219211 -0.9092714   -0.077788032
## 2080   0.8707164   0.18042688  -0.59800968   1.0217701 -0.9092714   -0.130250344
## 2081   0.8707164   0.18042688  -0.59800968   1.0217701 -0.9092714    0.009649153
## 2082   0.8707164   0.18042688  -0.59800968   1.0218348 -0.9092714   -0.392561899
## 2083   0.8707164   0.05604966  -0.59800968   1.0218133 -0.9067866   -0.147737781
## 2084   0.8707164   0.05604966  -0.59800968   1.0218995 -0.9067866   -0.462511647
## 2085   0.8707164   0.05604966  -0.59800968   1.0217486 -0.9067866   -0.514973958
## 2086   0.8707164   0.05604966  -0.59800968   1.0217270 -0.9067866    0.132061212
## 2087   0.8707164   0.05604966  -0.59800968   1.0218780 -0.9067866   -0.165225218
## 2088   0.8707164   0.05604966  -0.59800968   1.0217486 -0.9067866   -0.252662403
## 2089   0.8707164   0.05604966  -0.59800968   1.0216623 -0.9067866    0.044624027
## 2090   0.8707164   0.05604966  -0.59800968   1.0216838 -0.9067866   -0.305124714
## 2091   0.8707164   0.05604966  -0.59800968   1.0218348 -0.9067866   -0.182712655
## 2092   0.8707164   0.05604966  -0.59800968   1.0216838 -0.9043019   -0.200200092
## 2093   0.8707164   0.05604966  -0.59800968   1.0215976 -0.9043019   -0.165225218
## 2094   0.8707164   0.05604966  -0.59800968   1.0217270 -0.9043019   -0.042813158
## 2095   0.8707164   0.05604966  -0.59800968   1.0218995 -0.9043019   -0.025325721
## 2096   0.8707164   0.05604966  -0.59800968   1.0217701 -0.9043019   -0.462511647
## 2097   0.8707164   0.05604966  -0.59800968   1.0215760 -0.9043019   -0.252662403
## 2098   0.8707164   0.05604966  -0.59800968   1.0217701 -0.9043019   -0.252662403
## 2099   0.8707164   0.05604966  -0.59800968   1.0217701 -0.9043019   -0.375074462
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## 2101   0.8707164   0.05604966  -0.59800968   1.0215976 -0.9043019   -0.445024210
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## 2103   0.8707164  -0.06832756  -0.59800968   1.0216838 -0.9018171   -0.252662403
## 2104   0.8707164  -0.06832756  -0.59800968   1.0215760 -0.9018171   -0.060300595
## 2105   0.8707164  -0.06832756  -0.59800968   1.0214897 -0.9018171   -0.445024210
## 2106   0.8707164  -0.06832756  -0.59800968   1.0216838 -0.9018171    0.062111464
## 2107   0.8707164  -0.06832756  -0.59800968   1.0216407 -0.9018171    0.167036086
## 2108   0.8707164  -0.06832756  -0.59800968   1.0218348 -0.9018171   -0.095275469
## 2109   0.8707164  -0.06832756  -0.59800968   1.0215328 -0.9018171    0.009649153
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## 2116   0.8423524   0.05604966  -0.61518864   1.0218348 -0.8993323    0.009649153
## 2117   0.8423524   0.05604966  -0.61518864   1.0217270 -0.8993323    0.202010960
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## 2119   0.8423524   0.05604966  -0.61518864   1.0218133 -0.8993323   -0.200200092
## 2120   0.8423524   0.05604966  -0.61518864   1.0218780 -0.8993323   -0.060300595
## 2121   0.8423524   0.05604966  -0.61518864   1.0217054 -0.8993323   -0.182712655
## 2122   0.8423524   0.05604966  -0.61518864   1.0215113 -0.8968475    0.132061212
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## 2140  0.8423524  0.18042688 -0.61518864  1.0217701 -0.8943628   0.394372767
## 2141  0.8423524  0.18042688 -0.61518864  1.0216191 -0.8943628  -0.077788032
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## 2147  0.8707164 -0.06832756 -0.61518864  1.0218133 -0.8918780   0.009649153
## 2148  0.8707164 -0.06832756 -0.61518864  1.0216838 -0.8918780   0.184523523
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## 2160  0.8139884  0.05604966 -0.61518864  1.0214897 -0.8893932  -0.042813158
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## 2162  0.8139884  0.05604966 -0.61518864  1.0214681 -0.8893932   0.062111464
## 2163  0.8139884  0.05604966 -0.61518864  1.0214466 -0.8869084   0.062111464
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## 2168  0.8423524 -0.06832756 -0.61518864  1.0216191 -0.8869084  -0.095275469
## 2169  0.8423524 -0.06832756 -0.61518864  1.0216623 -0.8869084  -0.217687529
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## 2172  0.8423524 -0.06832756 -0.61518864  1.0216407 -0.8869084   0.254473271
## 2173  0.8423524 -0.06832756 -0.61518864  1.0215544 -0.8844237  -0.007838284
## 2174  0.8139884 -0.06832756 -0.61518864  1.0216623 -0.8844237  -0.322612151
## 2175  0.8139884 -0.06832756 -0.61518864  1.0216838 -0.8844237   0.149548649
## 2176  0.8139884 -0.06832756 -0.61518864  1.0215760 -0.8844237  -0.147737781
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```

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## 2182   0.8139884 -0.06832756 -0.63236760   1.0218348 -0.8844237  -0.375074462
## 2183   0.8139884 -0.06832756 -0.63236760   1.0216191 -0.8819389  -0.252662403
## 2184   0.8423524 -0.06832756 -0.63236760   1.0215544 -0.8819389   0.027136590
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## 2187   0.8423524 -0.06832756 -0.63236760   1.0216191 -0.8819389  -0.112762907
## 2188   0.8423524 -0.06832756 -0.63236760   1.0217917 -0.8819389  -0.095275469
## 2189   0.8423524 -0.06832756 -0.63236760   1.0216191 -0.8819389  -0.112762907
## 2190   0.8423524 -0.06832756 -0.63236760   1.0216838 -0.8819389   0.044624027
## 2191   0.8423524 -0.06832756 -0.63236760   1.0215544 -0.8819389   0.202010960
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## 2194   0.8423524 -0.06832756 -0.63236760   1.0215328 -0.8794541   0.184523523
## 2195   0.8423524 -0.06832756 -0.63236760   1.0216407 -0.8794541  -0.095275469
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## 2211   0.8423524 -0.06832756 -0.63236760   1.0216623 -0.8769693  -0.060300595
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## 2214   0.8423524 -0.06832756 -0.63236760   1.0218133 -0.8744846  -0.007838284
## 2215   0.8139884 -0.19270479 -0.63236760   1.0215976 -0.8744846   0.044624027
## 2216   0.8139884 -0.19270479 -0.63236760   1.0214897 -0.8744846   0.114573775
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## 2219   0.8139884 -0.19270479 -0.63236760   1.0217270 -0.8744846   0.079598901
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## 2223   0.8139884 -0.19270479 -0.63236760   1.0215328 -0.8744846  -0.130250344
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## 2230   0.7856245 -0.06832756 -0.63236760   1.0215976 -0.8719998  -0.130250344
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## 2267   0.8139884 -0.19270479 -0.64954656   1.0214897 -0.8620607   -0.042813158
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## 2300   0.8139884 -0.19270479 -0.64954656   1.0207348 -0.8546064   -0.305124714
## 2301   0.8139884 -0.19270479 -0.64954656   1.0203681 -0.8546064   -0.410049336
## 2302   0.8139884 -0.19270479 -0.64954656   1.0201092 -0.8546064   -0.042813158
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## 2334   0.7856245 -0.06832756 -0.66672553   1.0104889 -0.8446673   -0.095275469
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## 3090   1.2961762   2.04608523 -1.07902062   1.0166795 -1.2770181   0.849046130
## 3091   1.2961762   2.04608523 -1.07902062   1.0166148 -1.2770181   0.866533567
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## 3099   1.3245401   2.04608523 -1.07902062   1.0165933 -1.2770181    0.849046130
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## 3102   1.3245401   2.04608523 -1.07902062   1.0167227 -1.2770181    0.866533567
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## 3106   1.3245401   2.04608523 -1.07902062   1.0165717 -1.2770181    0.866533567
## 3107   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181    0.884021004
## 3108   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181    0.953970752
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## 3110   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181    1.041407937
## 3111   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181    0.691659197
## 3112   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181    0.044624027
## 3113   1.3245401   2.04608523 -1.07902062   1.0166364 -1.2770181   -0.025325721
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## 3148   1.2961762   1.92170801 -1.07902062   1.0202602 -1.2670790    0.236985834
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## 3165  1.2678122  1.92170801 -1.07902062  1.0205622 -1.2621094  -0.060300595
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## 3214   1.2394482   1.54857634 -1.07902062   1.0205190 -1.2521703    0.062111464
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## 3218   1.2110842   1.54857634 -1.07902062   1.0204328 -1.2496856    0.149548649
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## 3230   1.1827202   1.54857634 -1.07902062   1.0203896 -1.2472008    0.149548649
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## 3272   1.1543562   1.29982189 -1.07902062   1.0205838 -1.2372617   -0.025325721
## 3273   1.1543562   1.29982189 -1.07902062   1.0203896 -1.2372617    0.044624027
## 3274   1.1543562   1.29982189 -1.07902062   1.0202818 -1.2347769   -0.060300595
## 3275   1.1543562   1.17544467 -1.07902062   1.0202818 -1.2347769   -0.042813158
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## 3277   1.1543562   1.17544467 -1.07902062   1.0203465 -1.2347769    0.044624027
## 3278   1.1543562   1.17544467 -1.07902062   1.0202602 -1.2347769    0.202010960
## 3279   1.1543562   1.17544467 -1.07902062   1.0203896 -1.2347769    0.236985834
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## 3286   1.1543562   1.17544467 -1.07902062   1.0202818 -1.2322921   -0.130250344
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## 3291   1.1543562   1.17544467 -1.07902062   1.0202171 -1.2322921   -0.077788032
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## 3298   1.0976283   1.17544467 -1.07902062   1.0204759 -1.2298074    0.341910456
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```

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## 3380   1.0692643   0.92669022 -1.07902062   1.0202602 -1.2099292    0.289448145
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## 3388   1.0409003   1.05106745 -1.07902062   1.0203249 -1.2074444    0.202010960
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## 6219   0.7005325 -0.56583646 -1.30234713  1.0021412 -0.7104894   0.271960708
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## 6221   0.7005325 -0.56583646 -1.30234713  1.0022275 -0.7080046   0.359397893
## 6222   0.7005325 -0.56583646 -1.30234713  1.0022490 -0.7080046   0.464322515
## 6223   0.7005325 -0.56583646 -1.30234713  1.0022275 -0.7080046   0.254473271
## 6224   0.7005325 -0.56583646 -1.30234713  1.0022490 -0.7080046   0.534272264
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## 6230   0.7005325 -0.56583646 -1.30234713   1.0022059 -0.7055199    0.236985834
## 6231   0.7005325 -0.56583646 -1.30234713   1.0020765 -0.7055199    0.202010960
## 6232   0.7005325 -0.56583646 -1.30234713   1.0019686 -0.7055199    0.289448145
## 6233   0.7005325 -0.56583646 -1.30234713   1.0021628 -0.7055199    0.271960708
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## 6235   0.7005325 -0.56583646 -1.30234713   1.0022059 -0.7055199    0.306935582
## 6236   0.7005325 -0.56583646 -1.30234713   1.0022059 -0.7055199    0.202010960
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## 6242   0.7005325 -0.56583646 -1.30234713   1.0022059 -0.7030351    0.271960708
## 6243   0.7005325 -0.56583646 -1.30234713   1.0022922 -0.7030351    0.376885330
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## 6247   0.7005325 -0.69021368 -1.30234713   1.0022922 -0.7030351    0.359397893
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## 6280   0.7005325 -0.56583646 -1.31952609   1.0025294 -0.6930960    0.027136590
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## 6287   0.7005325 -0.69021368 -1.31952609   1.0025726 -0.6930960   0.359397893
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## 6313   0.6721685 -0.69021368 -1.33670506   1.0021628 -0.6856417   0.411860204
## 6314   0.6721685 -0.56583646 -1.33670506   1.0023785 -0.6856417   0.394372767
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## 742 -1.0136372 1.0156149        -1.00
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## 745 -1.0136372 1.0156149        -1.00
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## 4027   0.9682806 -0.9844743        -1.00
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## 4029   0.9622443 -0.9844743        -1.00
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## 4037   0.9079176 -0.9844742        -1.00
## 4038   0.8998692 -0.9844742        -1.00
## 4039   0.8898087 -0.9844742        -1.00
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## 4042   0.8918208 -0.9844743        -1.00
## 4043   0.9099297 -0.9844743        -1.00
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## 4045   0.8998692 -0.9844743        -1.00
## 4046   0.8918208 -0.9844743        -1.00
## 4047   0.9139539 -0.9844743        -1.00
## 4048   0.9139539 -0.9844743        -1.00
## 4049   0.8716998 -0.9844743        -1.00
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## 4052   0.8475546 -0.9844743        -1.00
## 4053   0.8857845 -0.9844743        -1.00
## 4054   0.8556030 -0.9844743        -1.00
## 4055   0.8576151 -0.9844743        -1.00
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## 4058   0.8475546 -0.9844742        -1.00
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## 4115   0.8877966 -0.9844743        -1.00
## 4116   0.8877966 -0.9844743        -1.00
## 4117   0.8455425 -0.9844743        -1.00
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## 4190   1.0568130 -0.9844743         1.29
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## 4192   1.0608372 -0.9844743         1.29
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## 4195   1.0588251 -0.9844743         1.29
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## 4199   1.0548009 -0.9844743         1.29
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## 4245   1.0568130 -0.9844743        0.80
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## 6273 -0.9975404  1.0156223      -1.00
## 6274 -0.9935162  1.0156223      -1.00
## 6275 -0.9633348  1.0156223      -1.00
## 6276 -0.9935162  1.0156223      -1.00
## 6277 -1.0277219  1.0156223      -1.00
## 6278 -1.0317461  1.0156223      -1.00
## 6279 -1.0498550  1.0156223      -1.00
## 6280 -1.0176614  1.0156223      -1.00
## 6281 -1.0257098  1.0156223      -1.00
## 6282 -1.0518671  1.0156223      -1.00
## 6283 -1.0337582  1.0156223      -1.00
## 6284 -0.9975404  1.0156223      -1.00
## 6285 -1.0216856  1.0156223      -1.00
## 6286 -0.9713832  1.0156223      -1.00
## 6287 -1.0216856  1.0156223      -1.00
## 6288 -1.0337582  1.0156223      -1.00
## 6289 -1.0116251  1.0156223      -1.00
## 6290 -0.9874799  1.0156223      -1.00
## 6291 -1.0055888  1.0156223      -1.00
## 6292 -0.9975404  1.0156223      -1.00
## 6293 -1.0216856  1.0156223      -1.00
## 6294 -1.0136372  1.0156223      -1.00
## 6295 -0.9975404  1.0156223      -1.00
## 6296 -1.0397945  1.0156223      -1.00
## 6297 -1.0096130  1.0156223      -1.00
## 6298 -1.0156493  1.0156223      -1.00
## 6299 -1.0216856  1.0156223      -1.00
## 6300 -1.0196735  1.0156223      -1.00
## 6301 -1.0236977  1.0156223      -1.00
## 6302 -1.0518671  1.0156223      -1.00
## 6303 -1.0558913  1.0156223      -1.00
## 6304 -1.0357703  1.0156223      -1.00
## 6305 -1.0277219  1.0156223      -1.00
## 6306 -0.9894920  1.0156223      -1.00
## 6307 -1.0418066  1.0156223      -1.00
```

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## 6308 -1.0357703  1.0156223      -1.00
## 6309 -1.0096130  1.0156223      -1.00
## 6310 -1.0659518  1.0156223      -1.00
## 6311 -1.0478429  1.0156223      -1.00
## 6312 -1.0418066  1.0156223      -1.00
## 6313 -1.0357703  1.0156223      -1.00
## 6314 -1.0418066  1.0156223      -1.00
## 6315 -1.0377824  1.0156223      -1.00
## 6316 -1.0196735  1.0156223      -1.00
## 6317 -1.0196735  1.0156223      -1.00
## 6318 -1.0397945  1.0156223      -1.00
## 6319 -1.0035767  1.0156223      -1.00
## 6320 -1.0337582  1.0156223      -1.00
## 6321 -1.0478429  1.0156223      -1.00
## 6322 -1.0116251  1.0156223      -1.00
## 6323 -1.0216856  1.0156223      -1.00
## 6324 -1.0257098  1.0156223      -1.00
## 6325 -1.0257098  1.0156223      -1.00
## 6326 -1.0196735  1.0156223      -1.00
## 6327 -1.0438187  1.0156223      -1.00
## 6328 -1.0156493  1.0156223      -1.00
## 6329 -0.9894920  1.0156223      -1.00
## 6330 -1.0277219  1.0156223      -1.00
## 6331 -1.0136372  1.0156223      -1.00
## 6332 -1.0337582  1.0156223      -1.00
## 6333 -0.9774194  1.0156223      -1.00
## 6334 -1.0236977  1.0156223      -1.00
## 6335 -0.9975404  1.0156223      -1.00
## 6336 -0.9512622  1.0156223      -1.00
## 6337 -1.0216856  1.0156223      -1.00
## 6338 -1.0156493  1.0156223      -1.00
## 6339 -1.0297340  1.0156223      -1.00
## 6340 -1.0055888  1.0156223      -1.00
## 6341 -1.0397945  1.0156223      -1.00
## 6342 -0.9955283  1.0156223      -1.00
## 6343 -0.9653469  1.0156223      -1.00
## 6344 -0.9955283  1.0156223      -1.00
## 6345 -0.9975404  1.0156223      -1.00
## 6346 -0.9915041  1.0156223      -1.00
## 6347 -0.9874799  1.0156223      -1.00
## 6348 -1.0176614  1.0156223      -1.00
## 6349 -1.0196735  1.0156223      -1.00
## 6350 -0.9894920  1.0156223      -1.00
## 6351 -0.9774194  1.0156223      -1.00
## 6352 -1.0136372  1.0156223      -1.00
## 6353 -0.9975404  1.0156223      -1.00
## 6354 -0.9874799  1.0156223      -1.00
## 6355 -1.0055888  1.0156223      -1.00
## 6356 -1.0337582  1.0156223      -1.00
## 6357 -0.9854678  1.0156223      -1.00
## 6358 -0.9975404  1.0156223      -1.00
## 6359 -1.0216856  1.0156223      -1.00
## 6360 -1.0035767  1.0156223      -1.00
## 6361 -0.9814436  1.0156223      -1.00
```

```
## 6362 -0.9492501  1.0156223      -1.00
## 6363 -0.9754073  1.0156223      -1.00
## 6364 -0.9935162  1.0156223      -1.00
## 6365 -1.0176614  1.0156223      -1.00
## 6366 -1.0176614  1.0156223      -1.00
## 6367 -1.0076009  1.0156223      -1.00
## 6368 -1.0277219  1.0156223      -1.00
## 6369 -0.9733952  1.0156223      -1.00
## 6370 -0.9955283  1.0156223      -1.00
## 6371 -1.0337582  1.0156223      -1.00
## 6372 -0.9955283  1.0156223      -1.00
## 6373 -1.0096130  1.0156223      -1.00
## 6374 -0.9834557  1.0156223      -1.00
## 6375 -0.9512622  1.0156223      -1.00
## 6376 -0.9633348  1.0156223      -1.00
## 6377 -0.9975404  1.0156223      -1.00
## 6378 -0.9713832  1.0156223      -1.00
## 6379 -0.9794315  1.0156223      -1.00
## 6380 -0.9512622  1.0156223      -1.00
## 6381 -0.9794315  1.0156223      -1.00
## 6382 -0.9794315  1.0156223      -1.00
## 6383 -0.9633348  1.0156223      -1.00
## 6384 -1.0076009  1.0156223      -1.00
## 6385 -1.0196735  1.0156223      -1.00
## 6386 -1.0156493  1.0156223      -1.00
## 6387 -0.9854678  1.0156223      -1.00
## 6388 -0.9894920  1.0156223      -1.00
## 6389 -0.9774194  1.0156223      -1.00
## 6390 -1.0277219  1.0156223      -1.00
## 6391 -1.0357703  1.0156223      -1.00
## 6392 -1.0015646  1.0156223      -1.00
## 6393 -0.9975404  1.0156223      -1.00
## 6394 -0.9975404  1.0156223      -1.00
## 6395 -0.9754073  1.0156223      -1.00
## 6396 -1.0076009  1.0156223      -1.00
## 6397 -1.0357703  1.0156223      -1.00
## 6398 -0.9794315  1.0156223      -1.00
## 6399 -1.0015646  1.0156223      -1.00
## 6400 -0.9955283  1.0156223      -1.00
## 6401 -0.9693711  1.0156223      -1.00
## 6402 -0.9693711  1.0156223      -1.00
## 6403 -1.0176614  1.0156223      -1.00
## 6404 -0.9995525  1.0156223      -1.00
## 6405 -0.9512622  1.0156223      -1.00
## 6406 -1.0055888  1.0156223      -1.00
## 6407 -1.0156493  1.0156223      -1.00
## 6408 -0.9915041  1.0156223      -1.00
## 6409 -0.9894920  1.0156223      -1.00
## 6410 -0.9874799  1.0156223      -1.00
## 6411 -0.9794315  1.0156223      -1.00
## 6412 -0.9653469  1.0156223      -1.00
## 6413 -0.9874799  1.0156223      -1.00
## 6414 -0.9854678  1.0156223      -1.00
## 6415 -0.9713832  1.0156223      -1.00
```

```
## 6416 -0.9633348  1.0156223       -1.00
## 6417 -1.0196735  1.0156223       -1.00
## 6418 -1.0035767  1.0156223       -1.00
## 6419 -0.9894920  1.0156223       -1.00
## 6420 -1.0096130  1.0156223       -1.00
## 6421 -1.0196735  1.0156223       -1.00
## 6422 -1.0096130  1.0156223       -1.00
## 6423 -0.9935162  1.0156223       -1.00
## 6424 -1.0176614  1.0156223       -1.00
## 6425 -1.0196735  1.0156223       -1.00
## 6426 -1.0136372  1.0156223       -1.00
## 6427 -1.0055888  1.0156223       -1.00
## 6428 -1.0478429  1.0156223       -1.00
## 6429 -0.9432138  1.0156223       -1.00
## 6430 -1.0216856  1.0156223       -1.00
## 6431 -0.9975404  1.0156223       -1.00
## 6432 -1.0438187  1.0156223       -1.00
## 6433 -1.0397945  1.0156223       -1.00
## 6434 -1.0800365  1.0156223       -1.00
## 6435 -1.0679639  1.0156223       -1.00
## 6436 -1.0599155  1.0156223       -1.00
## 6437 -1.0357703  1.0156223       -1.00
## 6438 -1.1021696  1.0156223       -1.00
## 6439 -0.9975404  1.0156223       -1.00
## 6440 -1.0236977  1.0156223       -1.00
## 6441 -1.0136372  1.0156223       -1.00
## 6442 -1.0116251  1.0156223       -1.00
## 6443 -1.0377824  1.0156223       -1.00
## 6444 -1.0438187  1.0156223       -1.00
## 6445 -0.9532743  1.0156223       -1.00
## 6446 -0.9955283  1.0156223       -1.00
## 6447 -1.0096130  1.0156223       -1.00
## 6448 -1.0317461  1.0156223       -1.00
## 6449 -1.0317461  1.0156223       -1.00
## 6450 -1.0397945  1.0156223       -1.00
## 6451 -1.0055888  1.0156223       -1.00
## 6452 -1.0196735  1.0156223       -1.00
## 6453 -1.0941212  1.0156223       -1.00
## 6454 -1.0297340  1.0156223       -1.00
## 6455 -1.0377824  1.0156223       -1.00
## 6456 -1.1001575  1.0156223       -1.00
## 6457 -1.0035767  1.0156223       -1.00
## 6458 -1.0196735  1.0156223       -1.00
## 6459 -0.9834557  1.0156223       -1.00
## 6460 -0.9894920  1.0156223       -1.00
## 6461 -0.9995525  1.0156223       -1.00
## 6462 -0.9955283  1.0156223       -1.00
## 6463 -0.9955283  1.0156223       -1.00
## 6464 -0.9834557  1.0156223       -1.00
## 6465 -0.9894920  1.0156223       -1.00
## 6466 -0.9774194  1.0156223       -1.00
## 6467 -0.9995525  1.0156223       -1.00
## 6468 -0.9794315  1.0156223       -1.00
## 6469 -0.9874799  1.0156223       -1.00
```

```
## 6470 -1.0257098  1.0156223      -1.00
## 6471 -1.0277219  1.0156223      -1.00
## 6472 -1.0317461  1.0156223      -1.00
## 6473 -1.0317461  1.0156223      -1.00
## 6474 -1.0659518  1.0156223      -1.00
## 6475 -1.0478429  1.0156223      -1.00
## 6476 -1.0236977  1.0156223      -1.00
## 6477 -1.0538792  1.0156223      -1.00
## 6478 -1.0518671  1.0156223      -1.00
## 6479 -1.0317461  1.0156223      -1.00
## 6480 -0.9995525  1.0156223      -1.00
## 6481 -1.0176614  1.0156223      -1.00
## 6482 -1.0136372  1.0156223      -1.00
## 6483 -1.1061938  1.0156223      -1.00
## 6484 -1.0055888  1.0156223      -1.00
## 6485 -0.9975404  1.0156223      -1.00
## 6486 -1.0196735  1.0156223      -1.00
## 6487 -1.0579034  1.0156223      -1.00
## 6488 -1.1001575  1.0156223      -1.00
## 6489 -1.0599155  1.0156223      -1.00
## 6490 -1.0438187  1.0156223      -1.00
## 6491 -1.0257098  1.0156223      -1.00
## 6492 -0.9572985  1.0156223      -1.00
## 6493 -0.9834557  1.0156223      -1.00
## 6494 -1.0055888  1.0156223      -1.00
## 6495 -0.9673590  1.0156223      -1.00
## 6496 -0.9794315  1.0156223      -1.00
## 6497 -0.9693711  1.0156223      -1.00
## 6498 -1.0176614  1.0156223      -1.00
## 6499 -1.0538792  1.0156223      -1.00
## 6500 -1.1907020  1.0156223      -1.00
## 6501 -1.0780244  1.0156223      -1.00
## 6502 -1.0860728  1.0156223      -1.00
## 6503 -1.1041817  1.0156223      -1.00
## 6504 -1.0579034  1.0156223      -1.00
## 6505 -1.0035767  1.0156223      -1.00
## 6506 -1.0599155  1.0156223      -1.00
## 6507 -1.0076009  1.0156223      -1.00
## 6508 -1.0035767  1.0156223      -1.00
## 6509 -1.0015646  1.0156223      -1.00
## 6510 -1.0297340  1.0156223      -1.00
## 6511 -1.0579034  1.0156223      -1.00
## 6512 -0.9834557  1.0156223      -1.00
## 6513 -1.0236977  1.0156223      -1.00
## 6514 -0.9935162  1.0156223      -1.00
## 6515 -1.0297340  1.0156223      -1.00
## 6516 -0.9673590  1.0156223      -1.00
## 6517 -0.9572985  1.0156223      -1.00
## 6518 -0.8888871  1.0156223      -1.00
## 6519 -0.9170565  1.0156223      -1.00
## 6520 -0.8405967  1.0156223      -1.00
## 6521 -0.8587056  1.0156223      -1.00
## 6522 -0.8868750  1.0156223      -1.00
## 6523 -0.8587056  1.0156223      -1.00
```

```
## 6524 -0.9512622  1.0156223      -1.00
## 6525 -1.0297340  1.0156223      -1.00
## 6526 -1.0498550  1.0156223      -1.00
## 6527 -1.0438187  1.0156223      -1.00
## 6528 -1.0599155  1.0156223      -1.00
## 6529 -1.0740002  1.0156223      -1.00
## 6530 -1.1001575  1.0156223      -1.00
## 6531 -1.0840607  1.0156223      -1.00
## 6532 -1.0337582  1.0156223      -1.00
## 6533 -1.0216856  1.0156223      -1.00
## 6534 -1.0096130  1.0156223      -1.00
## 6535 -0.9754073  1.0156223      -1.00
## 6536 -1.0337582  1.0156223      -1.00
## 6537 -1.0216856  1.0156223      -1.00
## 6538 -1.0659518  1.0156223      -1.00
## 6539 -1.0418066  1.0156223      -1.00
## 6540 -1.0076009  1.0156223      -1.00
## 6541 -1.0780244  1.0156223      -1.00
## 6542 -1.1021696  1.0156223      -1.00
## 6543 -1.1243027  1.0156223      -1.00
## 6544 -1.1625326  1.0156223      -1.00
## 6545 -1.1625326  1.0156223      -1.00
## 6546 -1.1746052  1.0156223      -1.00
## 6547 -1.1323511  1.0156223      -1.00
## 6548 -1.0900970  1.0156223      -1.00
## 6549 -1.0820486  1.0156223      -1.00
## 6550 -1.0418066  1.0156223      -1.00
## 6551 -1.0438187  1.0156223      -1.00
## 6552 -1.0740002  1.0156223      -1.00
## 6553 -1.0277219  1.0156223      -1.00
## 6554 -1.0317461  1.0156223      -1.00
## 6555 -1.0277219  1.0156223      -1.00
## 6556 -1.0176614  1.0156223      -1.00
## 6557 -1.0297340  1.0156223      -1.00
## 6558 -1.0317461  1.0156223      -1.00
## 6559 -1.3436215  1.0156223      -1.00
## 6560 -1.1866778  1.0156223      -1.00
## 6561 -1.4381902  1.0156223      -1.00
## 6562 -1.3677667  1.0156223      -1.00
## 6563 -1.2510650  1.0156223      -1.00
## 6564 -0.8285241  1.0156223      -1.00
## 6565 -1.0196735  1.0156223      -1.00
## 6566 -0.6293263  1.0156223      -1.00
## 6567 -0.5166487  1.0156223      -1.00
## 6568 -0.5689633  1.0156223      -1.00
## 6569 -0.5910964  1.0156223      -1.00
## 6570 -0.7158465  1.0156223      -1.00
## 6571 -0.7882821  1.0156223      -1.00
## 6572 -0.8748024  1.0156223      -1.00
## 6573 -1.0216856  1.0156223      -1.00
## 6574 -1.1403995  1.0156223      -1.00
## 6575 -0.9874799  1.0156223      -1.00
## 6576 -0.9774194  1.0156223      -1.00
## 6577 -1.3436215  1.0156223      -1.00
```

```
## 6578 -1.5528799  1.0156223      -1.00
## 6579 -1.5086137  1.0156223      -1.00
## 6580 -1.1484479  1.0156223      -1.00
## 6581 -0.8868750  1.0156223      -1.00
## 6582 -0.7077981  1.0156223      -1.00
## 6583 -0.7399917  1.0156223      -1.00
## 6584 -1.2470408  1.0156223      -1.00
## 6585 -1.3657546  1.0156223      -1.00
## 6586 -1.3214884  1.0156223      -1.00
## 6587 -1.3074037  1.0156223      -1.00
## 6588 -1.2711859  1.0156223      -1.00
## 6589 -1.1987504  1.0156223      -1.00
## 6590 -1.1504600  1.0156223      -1.00
## 6591 -1.1041817  1.0156223      -1.00
## 6592 -1.0418066  1.0156223      -1.00
## 6593 -1.0297340  1.0156223      -1.00
## 6594 -0.9210807  1.0156223      -1.00
## 6595 -0.5428060  1.0156223      -1.00
## 6596 -0.3536687  1.0156223      -1.00
## 6597 -0.3657413  1.0156223      -1.00
## 6598 -0.3999469  1.0156223      -1.00
## 6599 -0.5226850  1.0156223      -1.00
## 6600 -0.7178586  1.0156223      -1.00
## 6601 -0.7661490  1.0156223      -1.00
## 6602 -0.8788266  1.0156223      -1.00
## 6603 -1.0397945  1.0156223      -1.00
## 6604 -1.0740002  1.0156223      -1.00
## 6605 -1.0679639  1.0156223      -1.00
## 6606 -1.0941212  1.0156223      -1.00
## 6607 -1.0579034  1.0156223      -1.00
## 6608 -1.0579034  1.0156223      -1.00
## 6609 -1.0458308  1.0156223      -1.00
## 6610 -1.0418066  1.0156223      -1.00
## 6611 -1.0478429  1.0156223      -1.00
## 6612 -1.0538792  1.0156223      -1.00
## 6613 -1.0579034  1.0156223      -1.00
## 6614 -1.0297340  1.0156223      -1.00
## 6615 -1.0297340  1.0156223      -1.00
```

```
apply(df_scaled, 2, range)
```

```
##       timestamp      pitch      roll      yaw       vgx       vgy       vgz
## [1,]        -15 -21.193127 -2.674442 -1.754564 -2.474380 -8.605763 -1.341674
## [2,] 1636893370   2.230455  1.766196  1.662845  5.573049  8.574856  1.324540
##          templ         h       bat      baro        agx       agy       agz
## [1,] -1.187723 -2.384622 -1.049299 -1.2770181 -13.298290 -1.639400 -0.984476
## [2,]  2.170462  1.566540  1.022741  0.9874318   9.085629  2.579972  1.015622
##      wind.speed
## [1,]      -1.00
## [2,]       1.87
```

```
df
```

```
## # A tibble: 6,615 x 15
##      timestamp pitch  roll   yaw   vgx   vgy   vgz templ     h   bat  baro   agx
##          <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
```

```
## 1 1636886710.    0   0   58   0   0   0   69   0   90  969.   -14
## 2 1636886710.    0   0   58   0   0   0   69   0   90  969    -14
## 3 1636886710.    0   0   58   0   0   0   69   0   90  969    -13
## 4 1636886711.    0   0   58   0   0   0   69   0   90  969.   -14
## 5 1636886711.    0   0   58   0   0   0   69   0   90  969.   -13
## 6 1636886711.    0   0   58   0   0   0   69   0   90  969.   -12
## 7 1636886711.    0   0   58   0   0   0   69   0   90  969.   -14
## 8 1636886711.    0   0   58   0   0   0   69   0   90  969.   -13
## 9 1636886711.    0   0   58   0   0   0   69   0   90  969.   -13
## 10 1636886711.   0   0   58   0   0   0   69   0   90  969.   -13
## # ... with 6,605 more rows, and 3 more variables: agy <dbl>, agz <dbl>,
## #   wind.speed <dbl>
```

```
# Create Time Representations
# df$date = as_datetime(df$timestamp)
```

Imputation

Anomaly detection

Feature extraction

Dimensionality reduction

Methodology

Now that the data is ready for processing, how did you do it? Explain the models you used, the parameters you have chosen, and the results you obtained.

Model training

Evaluation of results

Discussion

You should now discuss your results and derive a wisdom out of this study.