

Practical 1 — River discharge & precipitation extremes (Neuchâtel)

2025-10-07

Contents

1	Introduction	1
2	0. Load packages and data	1
3	1. Exploratory plots (time series + seasonality)	2
4	2. Summary statistics	5
5	3. Annual maxima and GEV for discharge	5
6	4. Peaks-over-threshold (POT) and GPD for precipitation	7
7	5. Declustering	27
8	6. Tail dependence and scatter	27
9	7. Extreme causality tests	28
10	Takeaways	29
11	Rendering to PDF	29

1 Introduction

This report reproduces the worked solution for Practical 1. It loads the daily river discharge and precipitation data for Neuchâtel, performs exploratory data analysis, fits extreme-value models (block maxima GEV for discharge and POT/GPD for precipitation), conducts a simple declustering procedure, inspects tail dependence, and runs the provided extreme causality tests from `JuroExtremes.R`.

All code here is executed; figures are embedded below and results saved to `practical_1/practical1_results.rds`.

2 0. Load packages and data

```

required_pkgs <- c('readr','lubridate','ggplot2','dplyr','evd','ismev','forecast','knitr')
missing <- required_pkgs[!required_pkgs %in% installed.packages()[,1]]
if(length(missing)) install.packages(missing, repos = 'https://cloud.r-project.org')

library(readr); library(lubridate); library(ggplot2); library(dplyr)
library(evd); library(ismev); library(forecast)

fig_dir <- file.path('practical_1','figures')
if(!dir.exists(fig_dir)) dir.create(fig_dir, recursive = TRUE)

data_path <- file.path('practical_1','River_and_precip_Neuchatel.csv')
stopifnot(file.exists(data_path))
raw <- read_csv(data_path, col_types = cols(Date = col_date(format = "%Y-%m-%d"),
                                             RiverDischarge = col_double(),
                                             Precipitation = col_double()))

df <- raw %>% rename(date = Date, discharge = RiverDischarge, precip = Precipitation)

# basic table
kable(head(df, 6))

```

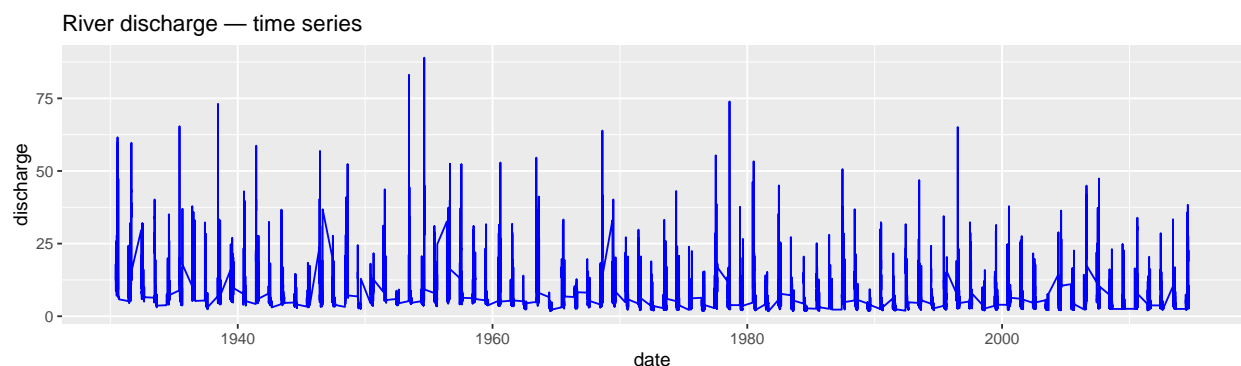
date	discharge	precip
1930-06-02	12.30	15.4
1930-06-03	14.30	0.0
1930-06-04	18.00	0.0
1930-06-05	12.10	0.0
1930-06-06	10.20	5.5
1930-06-07	8.81	1.3

3 1. Exploratory plots (time series + seasonality)

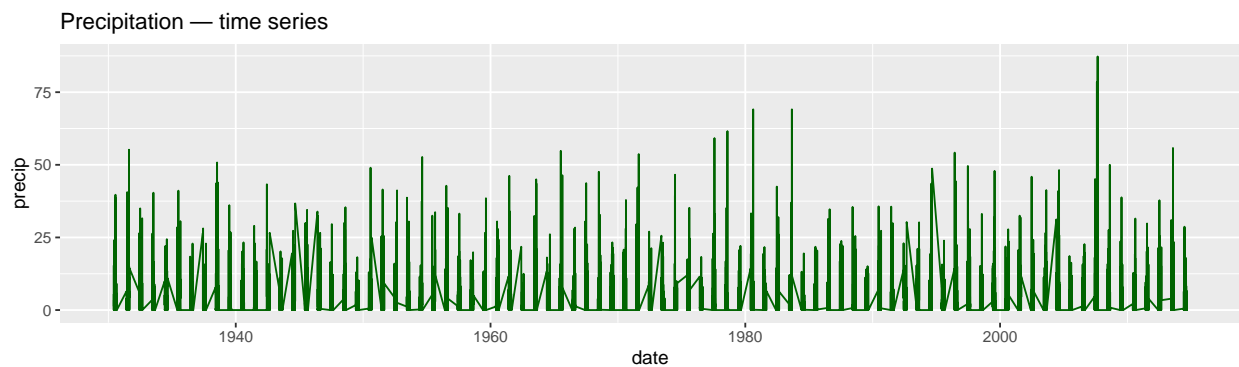
```

# ggplot time series
p1 <- ggplot(df, aes(x = date, y = discharge)) + geom_line(color='blue') + labs(title='River discharge')
print(p1)

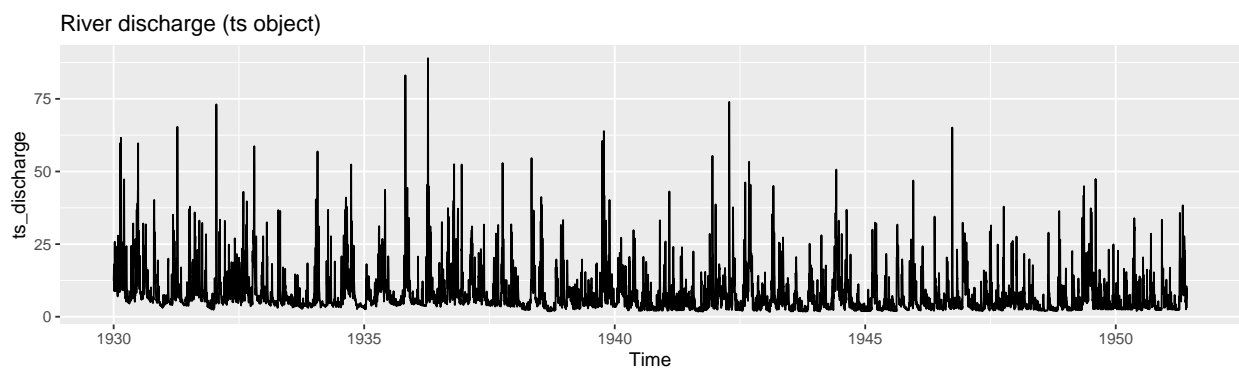
```



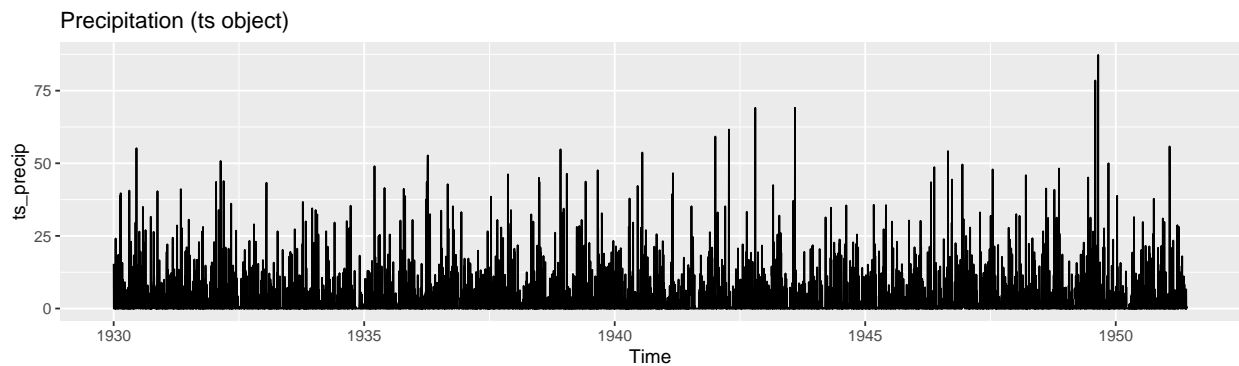
```
p2 <- ggplot(df, aes(x = date, y = precip)) + geom_line(color='darkgreen') + labs(title='Precipitation time series')
print(p2)
```



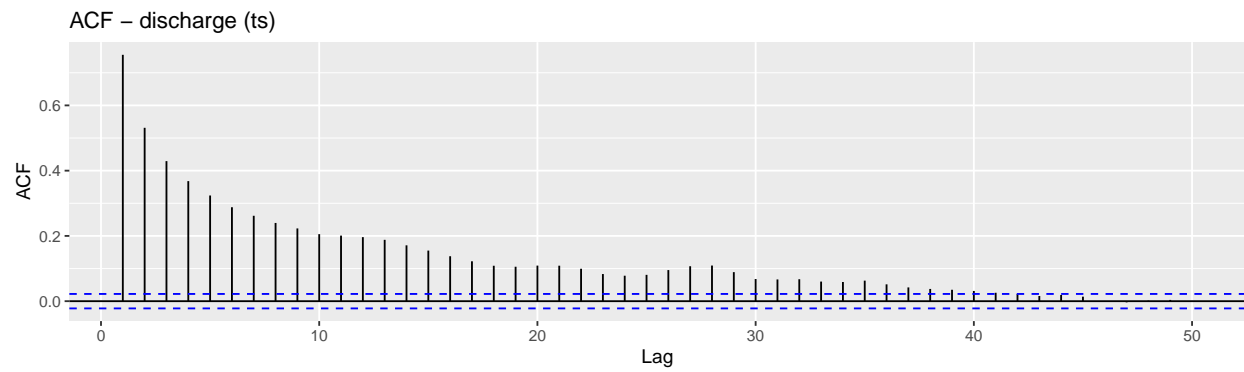
```
# ts objects
ts_start_year <- year(min(df$date, na.rm = TRUE))
ts_discharge <- ts(df$discharge, start = c(ts_start_year,1), frequency = 365)
ts_precip <- ts(df$precip, start = c(ts_start_year,1), frequency = 365)
print(autoplot(ts_discharge) + labs(title='River discharge (ts object)'))
```



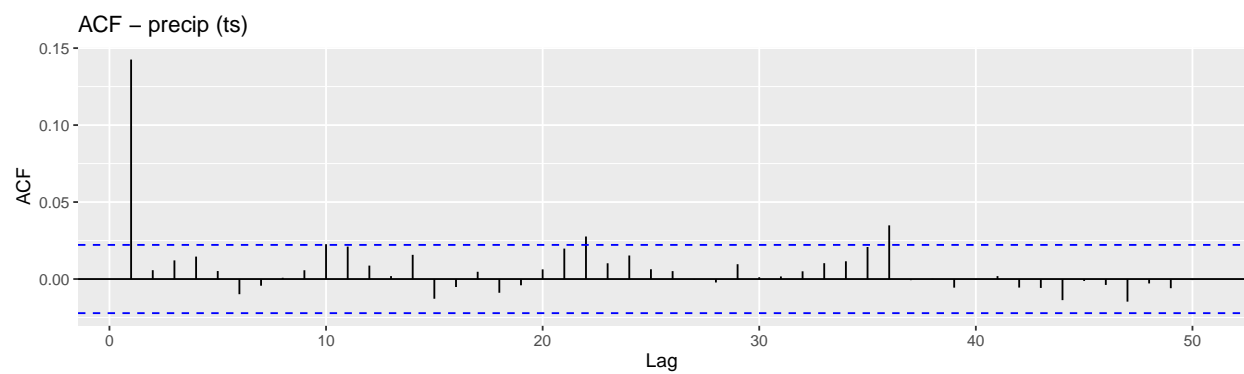
```
print(autoplot(ts_precip) + labs(title='Precipitation (ts object)'))
```



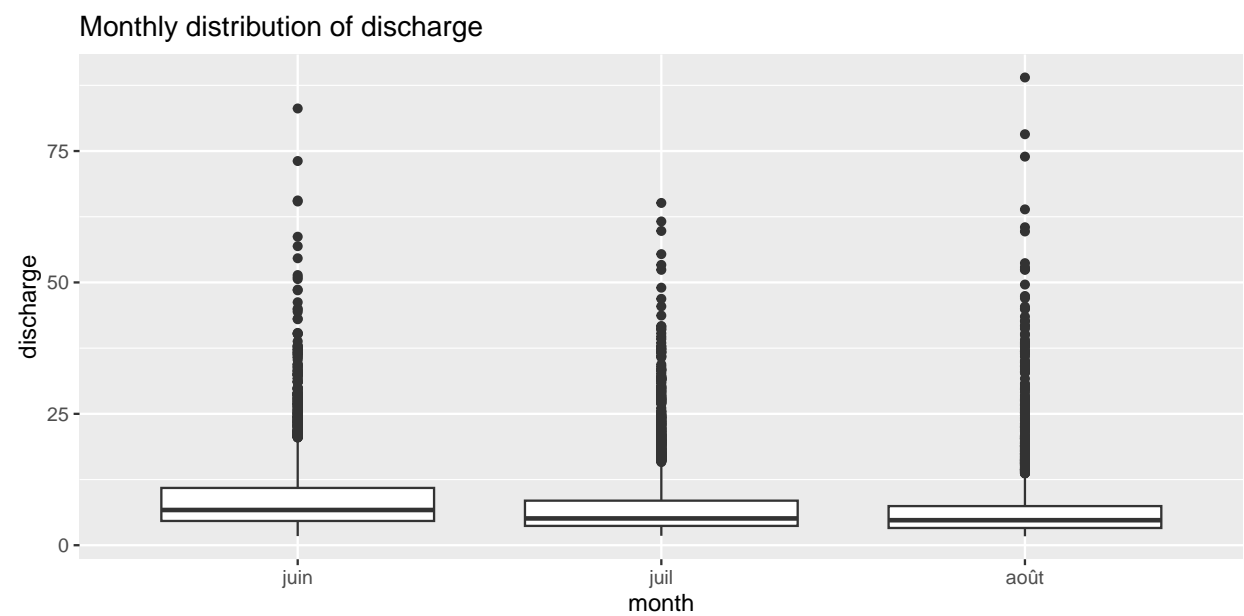
```
# ACFs
print(ggAcf(ts_discharge, lag.max = 50) + ggtitle('ACF - discharge (ts)'))
```



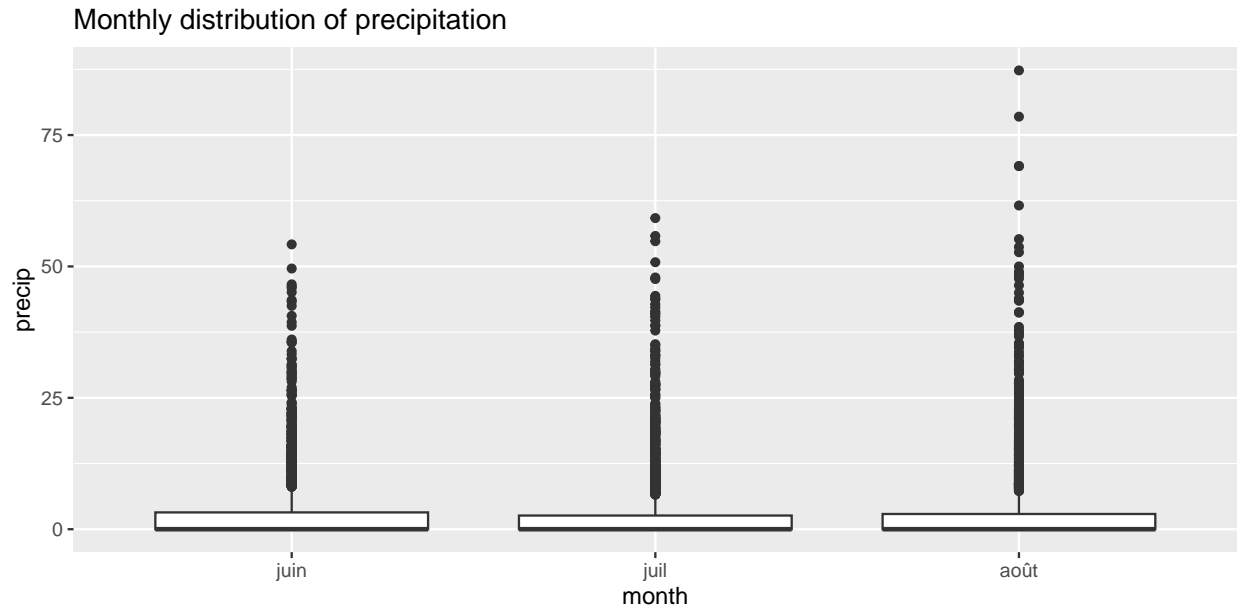
```
print(ggAcf(ts_precip, lag.max = 50) + ggtitle('ACF – precip (ts)'))
```



```
df <- df %>% mutate(month = month(date, label = TRUE))
print(ggplot(df, aes(x=month, y=discharge)) + geom_boxplot() + labs(title='Monthly distribution of discharge'))
```



```
print(ggplot(df, aes(x=month, y=precip)) + geom_boxplot() + labs(title='Monthly distribution of precipi
```



4 2. Summary statistics

```
summary_stats <- df %>% summarize(
  n = n(),
  discharge_mean = mean(discharge, na.rm=TRUE),
  discharge_sd = sd(discharge, na.rm=TRUE),
  precip_mean = mean(precip, na.rm=TRUE),
  precip_sd = sd(precip, na.rm=TRUE),
  missing_discharge = sum(is.na(discharge)),
  missing_precip = sum(is.na(precip))
)
summary_stats
```

```
## # A tibble: 1 x 7
##       n discharge_mean discharge_sd precip_mean precip_sd missing_discharge
##   <int>         <dbl>         <dbl>         <dbl>         <dbl>             <int>
## 1  7819          7.93          7.36          3.07          6.77              0
## # i 1 more variable: missing_precip <int>
```

5 3. Annual maxima and GEV for discharge

```
# annual maxima
library(stats)
df <- df %>% mutate(year = year(date))
annual_max <- df %>% group_by(year) %>% summarize(max_discharge = max(discharge, na.rm = TRUE)) %>% ung
```

```

gev_fit <- fgev(annual_max$max_discharge)
print(gev_fit)

##
## Call: fgev(x = annual_max$max_discharge)
## Deviance: 713.2291
##
## Estimates
##      loc      scale      shape
## 28.35273 13.90569 -0.03091
##
## Standard Errors
##      loc      scale      shape
## 1.70891 1.23774 0.08415
##
## Optimization Information
##   Convergence: successful
##   Function Evaluations: 29
##   Gradient Evaluations: 7

loc <- gev_fit$estimate['loc']; scale <- gev_fit$estimate['scale']; shape <- gev_fit$estimate['shape']
rl_100 <- qgev(1 - 1/100, loc = loc, scale = scale, shape = shape)
cat('Estimated 100-year return level (discharge):', rl_100, '\n')

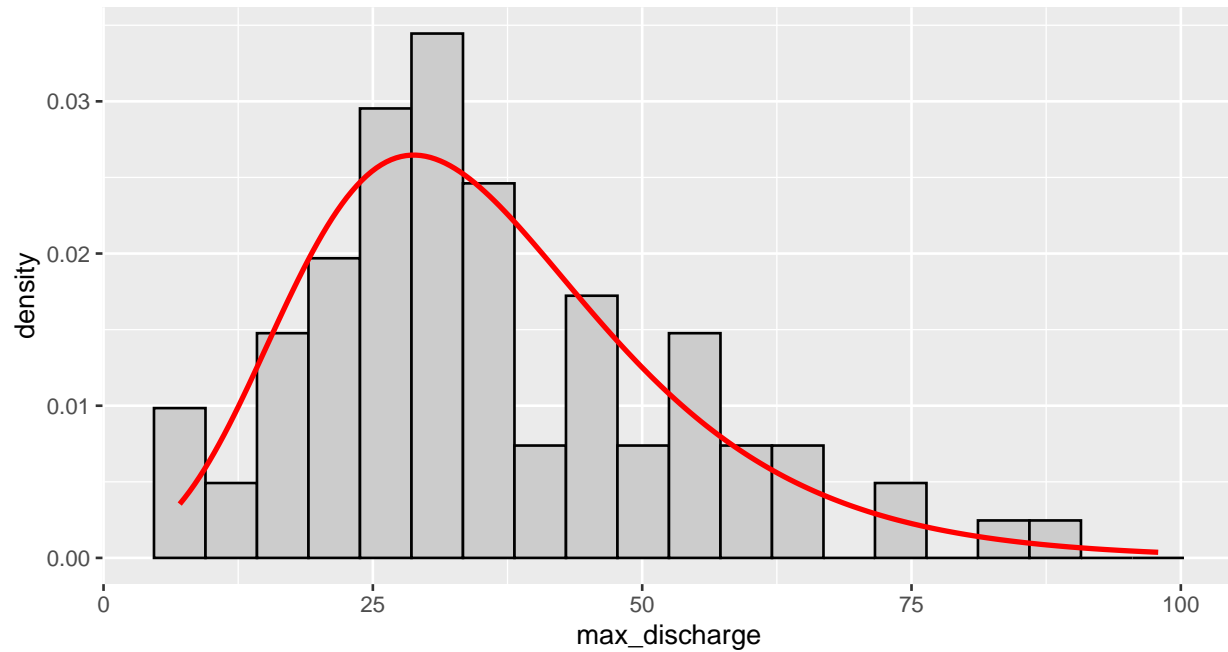
## Estimated 100-year return level (discharge): 87.98176

xv <- seq(min(annual_max$max_discharge)*0.9, max(annual_max$max_discharge)*1.1, length.out=200)
gev_dens <- dgev(xv, loc=loc, scale=scale, shape=shape)
dens_df <- data.frame(x = xv, y = gev_dens)

p_gev <- ggplot(annual_max, aes(x = max_discharge)) +
  geom_histogram(aes(y = after_stat(density)), bins = 20, fill = 'grey80', color = 'black') +
  geom_line(data = dens_df, aes(x = x, y = y), color = 'red', linewidth = 1, inherit.aes = FALSE) +
  labs(title = 'Annual maxima and fitted GEV (discharge)')
print(p_gev)

```

Annual maxima and fitted GEV (discharge)



6 4. Peaks-over-threshold (POT) and GPD for precipitation

```
threshold95 <- quantile(df$precip, 0.95, na.rm=TRUE)
th <- as.numeric(threshold95)
exceedances <- df$precip[df$precip > th]
excesses <- exceedances - th
cat('Threshold used (95%):', th, 'Number exceedances:', length(excesses), '\n')
```

```
## Threshold used (95%): 16.01 Number exceedances: 391
```

```
gpd_fit <- gpd.fit(df$precip, threshold = th, show = FALSE)
print(gpd_fit)
```

```
## $trans
## [1] FALSE
##
## $model
## $model[[1]]
## NULL
##
## $model[[2]]
## NULL
##
##
## $link
## [1] "c(identity, identity)"
##
```

```

## $threshold
## [1] 16.01
##
## $nexc
## [1] 391
##
## $data
## [1] 24.1 18.5 38.7 39.7 40.6 23.0 21.1 18.3 29.6 55.2 21.0 26.5 19.6 35.0 22.7
## [16] 27.0 31.6 26.4 17.3 40.4 16.6 19.5 22.1 16.1 24.4 28.6 41.1 27.7 19.7 21.1
## [31] 30.6 18.4 16.9 16.8 22.9 26.5 28.1 22.9 43.6 24.1 33.9 20.9 29.1 25.1 50.8
## [46] 20.5 19.0 43.9 21.0 20.6 36.1 26.8 20.2 23.3 29.0 23.0 16.7 20.9 28.6 43.3
## [61] 26.6 20.2 17.8 19.5 18.7 27.3 20.6 22.3 36.7 30.0 34.5 22.6 33.9 31.4 32.4
## [76] 22.8 25.5 26.6 21.3 20.3 16.5 29.6 30.1 18.2 27.7 16.2 35.4 18.2 16.4 49.0
## [91] 21.8 17.7 24.9 25.4 41.5 18.6 25.5 30.3 20.1 41.2 38.7 19.5 17.0 30.5 16.6
## [106] 37.5 43.5 47.7 52.7 32.5 33.7 20.8 17.9 16.6 42.8 27.5 35.2 16.1 27.1 18.5
## [121] 20.3 33.2 17.2 17.2 19.9 26.6 38.5 18.0 30.5 16.7 27.9 16.6 22.2 16.2 24.3
## [136] 46.2 29.3 25.9 33.9 17.0 17.8 20.6 19.4 21.8 22.1 32.4 29.9 21.7 45.0 43.6
## [151] 21.0 19.0 18.1 26.1 54.8 21.4 33.0 34.4 46.4 21.6 28.1 28.4 30.5 21.7 43.7
## [166] 22.6 16.2 47.6 27.6 18.7 32.8 27.8 17.6 16.6 18.9 19.4 23.3 21.4 19.4 19.9
## [181] 20.8 28.1 21.6 37.9 29.6 42.2 18.0 27.8 53.7 17.0 18.5 21.6 27.0 17.7 21.3
## [196] 25.6 20.1 23.2 18.5 39.4 46.6 17.5 35.2 24.6 20.1 18.3 17.1 17.7 19.7 26.3
## [211] 17.3 21.0 20.6 17.4 59.2 17.9 33.1 16.8 35.2 31.6 61.6 20.7 22.1 19.4 33.3
## [226] 16.8 19.2 16.1 69.1 19.4 21.7 42.5 22.9 17.0 17.4 18.7 25.5 32.0 26.0 19.2
## [241] 37.1 69.1 19.5 20.5 21.3 21.8 20.5 31.4 17.4 34.7 16.8 22.7 18.9 18.5 18.0
## [256] 19.1 23.8 22.5 18.3 17.2 16.9 22.1 35.5 16.4 22.8 22.2 25.5 21.0 16.8 35.7
## [271] 21.7 22.2 18.1 19.7 27.3 23.1 35.6 29.9 20.8 23.0 30.3 21.1 18.6 18.3 30.2
## [286] 21.1 19.4 21.3 43.5 48.7 23.9 54.2 17.8 29.5 44.4 22.5 18.3 16.8 49.6 17.3
## [301] 30.8 25.0 19.9 20.1 27.9 18.4 33.1 19.5 16.1 20.4 31.9 47.9 16.4 21.4 21.9
## [316] 17.8 27.8 23.7 20.7 19.2 18.6 32.5 31.9 45.9 22.3 24.2 19.4 16.4 18.8 26.6
## [331] 22.4 20.0 41.3 16.7 31.2 40.9 23.9 31.3 29.8 48.2 25.8 24.6 18.6 16.3 18.6
## [346] 16.9 19.9 22.7 18.1 45.1 22.9 22.2 31.3 20.6 26.5 19.2 78.5 21.7 26.4 87.3
## [361] 16.1 21.1 27.6 21.1 19.9 50.0 23.7 38.8 19.3 17.9 31.5 20.2 29.8 21.6 16.2
## [376] 21.4 18.7 17.3 25.7 37.8 20.9 21.6 31.0 29.8 55.8 43.9 20.9 23.4 28.7 28.1
## [391] 18.0
##
## $conv
## [1] 0
##
## $nllh
## [1] 1311.112
##
## $vals
##
##                                     u
## [1,] 10.45308 0.006331296 16.01
## [2,] 10.45308 0.006331296 16.01
## [3,] 10.45308 0.006331296 16.01
## [4,] 10.45308 0.006331296 16.01
## [5,] 10.45308 0.006331296 16.01
## [6,] 10.45308 0.006331296 16.01
## [7,] 10.45308 0.006331296 16.01
## [8,] 10.45308 0.006331296 16.01
## [9,] 10.45308 0.006331296 16.01
## [10,] 10.45308 0.006331296 16.01
## [11,] 10.45308 0.006331296 16.01

```


[illegible]

```
## [66,] 10.45308 0.006331296 16.01
## [67,] 10.45308 0.006331296 16.01
## [68,] 10.45308 0.006331296 16.01
## [69,] 10.45308 0.006331296 16.01
## [70,] 10.45308 0.006331296 16.01
## [71,] 10.45308 0.006331296 16.01
## [72,] 10.45308 0.006331296 16.01
## [73,] 10.45308 0.006331296 16.01
## [74,] 10.45308 0.006331296 16.01
## [75,] 10.45308 0.006331296 16.01
## [76,] 10.45308 0.006331296 16.01
## [77,] 10.45308 0.006331296 16.01
## [78,] 10.45308 0.006331296 16.01
## [79,] 10.45308 0.006331296 16.01
## [80,] 10.45308 0.006331296 16.01
## [81,] 10.45308 0.006331296 16.01
## [82,] 10.45308 0.006331296 16.01
## [83,] 10.45308 0.006331296 16.01
## [84,] 10.45308 0.006331296 16.01
## [85,] 10.45308 0.006331296 16.01
## [86,] 10.45308 0.006331296 16.01
## [87,] 10.45308 0.006331296 16.01
## [88,] 10.45308 0.006331296 16.01
## [89,] 10.45308 0.006331296 16.01
## [90,] 10.45308 0.006331296 16.01
## [91,] 10.45308 0.006331296 16.01
## [92,] 10.45308 0.006331296 16.01
## [93,] 10.45308 0.006331296 16.01
## [94,] 10.45308 0.006331296 16.01
## [95,] 10.45308 0.006331296 16.01
## [96,] 10.45308 0.006331296 16.01
## [97,] 10.45308 0.006331296 16.01
## [98,] 10.45308 0.006331296 16.01
## [99,] 10.45308 0.006331296 16.01
## [100,] 10.45308 0.006331296 16.01
## [101,] 10.45308 0.006331296 16.01
## [102,] 10.45308 0.006331296 16.01
## [103,] 10.45308 0.006331296 16.01
## [104,] 10.45308 0.006331296 16.01
## [105,] 10.45308 0.006331296 16.01
## [106,] 10.45308 0.006331296 16.01
## [107,] 10.45308 0.006331296 16.01
## [108,] 10.45308 0.006331296 16.01
## [109,] 10.45308 0.006331296 16.01
## [110,] 10.45308 0.006331296 16.01
## [111,] 10.45308 0.006331296 16.01
## [112,] 10.45308 0.006331296 16.01
## [113,] 10.45308 0.006331296 16.01
## [114,] 10.45308 0.006331296 16.01
## [115,] 10.45308 0.006331296 16.01
## [116,] 10.45308 0.006331296 16.01
## [117,] 10.45308 0.006331296 16.01
## [118,] 10.45308 0.006331296 16.01
## [119,] 10.45308 0.006331296 16.01
```

[illegible]

[illegible]

[228,] 10.45308 0.006331296 16.01
[229,] 10.45308 0.006331296 16.01
[230,] 10.45308 0.006331296 16.01
[231,] 10.45308 0.006331296 16.01
[232,] 10.45308 0.006331296 16.01
[233,] 10.45308 0.006331296 16.01
[234,] 10.45308 0.006331296 16.01
[235,] 10.45308 0.006331296 16.01
[236,] 10.45308 0.006331296 16.01
[237,] 10.45308 0.006331296 16.01
[238,] 10.45308 0.006331296 16.01
[239,] 10.45308 0.006331296 16.01
[240,] 10.45308 0.006331296 16.01
[241,] 10.45308 0.006331296 16.01
[242,] 10.45308 0.006331296 16.01
[243,] 10.45308 0.006331296 16.01
[244,] 10.45308 0.006331296 16.01
[245,] 10.45308 0.006331296 16.01
[246,] 10.45308 0.006331296 16.01
[247,] 10.45308 0.006331296 16.01
[248,] 10.45308 0.006331296 16.01
[249,] 10.45308 0.006331296 16.01
[250,] 10.45308 0.006331296 16.01
[251,] 10.45308 0.006331296 16.01
[252,] 10.45308 0.006331296 16.01
[253,] 10.45308 0.006331296 16.01
[254,] 10.45308 0.006331296 16.01
[255,] 10.45308 0.006331296 16.01
[256,] 10.45308 0.006331296 16.01
[257,] 10.45308 0.006331296 16.01
[258,] 10.45308 0.006331296 16.01
[259,] 10.45308 0.006331296 16.01
[260,] 10.45308 0.006331296 16.01
[261,] 10.45308 0.006331296 16.01
[262,] 10.45308 0.006331296 16.01
[263,] 10.45308 0.006331296 16.01
[264,] 10.45308 0.006331296 16.01
[265,] 10.45308 0.006331296 16.01
[266,] 10.45308 0.006331296 16.01
[267,] 10.45308 0.006331296 16.01
[268,] 10.45308 0.006331296 16.01
[269,] 10.45308 0.006331296 16.01
[270,] 10.45308 0.006331296 16.01
[271,] 10.45308 0.006331296 16.01
[272,] 10.45308 0.006331296 16.01
[273,] 10.45308 0.006331296 16.01
[274,] 10.45308 0.006331296 16.01
[275,] 10.45308 0.006331296 16.01
[276,] 10.45308 0.006331296 16.01
[277,] 10.45308 0.006331296 16.01
[278,] 10.45308 0.006331296 16.01
[279,] 10.45308 0.006331296 16.01
[280,] 10.45308 0.006331296 16.01
[281,] 10.45308 0.006331296 16.01

[illegible]

```

## [390,] 10.45308 0.006331296 16.01
## [391,] 10.45308 0.006331296 16.01
##
## $mle
## [1] 10.453078987 0.006331296
##
## $rate
## [1] 0.05000639
##
## $cov
##           [,1]           [,2]
## [1,] 0.58402011 -0.028973011
## [2,] -0.02897301 0.002788572
##
## $se
## [1] 0.76421209 0.05280693
##
## $n
## [1] 7819
##
## $npy
## [1] 365
##
## $xdata
## [1] 15.4 0.0 0.0 0.0 5.5 1.3 3.5 0.0 0.0 0.0 0.0 0.0 0.9 0.0
## [15] 24.1 0.0 0.0 1.2 0.2 0.0 0.0 0.1 4.4 0.2 1.2 3.4 0.5 0.0
## [29] 0.0 9.4 0.0 0.0 0.0 0.0 0.0 18.5 0.0 0.0 0.0 3.7 5.7 0.7 0.1
## [43] 11.7 0.1 0.0 9.8 38.7 2.9 0.2 7.3 0.0 39.7 5.6 1.2 0.6 7.3
## [57] 4.9 0.0 0.0 3.7 0.0 8.0 2.9 15.7 2.3 10.0 0.0 1.4 0.0 0.5
## [71] 0.0 5.8 0.5 5.9 2.8 0.0 0.0 0.0 1.0 0.0 2.0 9.1 0.0 0.0
## [85] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6.4 1.5 0.0 0.0 0.0 4.0 3.7
## [99] 0.3 0.0 0.0 0.0 0.3 0.0 0.0 0.0 0.0 7.3 2.4 0.0 2.5 0.0
## [113] 0.0 0.1 40.6 7.5 0.0 0.1 8.2 0.0 0.0 5.5 0.0 9.1 14.4 0.0
## [127] 23.0 21.1 1.7 0.6 0.0 0.0 0.0 4.7 9.4 8.6 1.2 0.0 0.0 14.4
## [141] 9.9 1.1 0.0 0.5 0.0 0.0 0.0 18.3 2.2 0.0 0.0 0.0 4.1 3.0
## [155] 2.3 0.0 0.3 15.6 7.1 29.6 2.8 0.6 1.1 0.0 0.0 1.1 55.2 0.5
## [169] 3.9 0.5 6.6 5.1 8.5 14.9 10.7 10.5 11.3 0.0 0.0 0.0 5.1 4.4
## [183] 14.3 6.3 21.0 0.2 0.2 26.5 1.1 0.1 0.0 0.0 0.0 0.0 4.8 19.6
## [197] 0.0 0.0 0.0 0.0 0.0 14.5 1.8 3.8 1.1 1.7 6.0 1.7 0.0 0.0
## [211] 0.0 0.0 0.0 35.0 4.8 0.0 0.0 8.0 22.7 2.0 1.7 5.6 0.0 1.7
## [225] 2.5 6.3 0.1 11.7 1.6 1.6 0.0 1.0 27.0 0.0 0.0 5.3 0.0 1.9
## [239] 0.9 0.4 0.0 0.0 0.0 0.2 6.6 1.3 4.1 8.0 4.3 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 5.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [267] 3.5 0.0 0.0 0.0 31.6 0.0 0.0 9.3 0.0 3.4 0.0 0.0 0.0 0.0
## [281] 0.0 0.0 0.0 0.0 1.4 1.8 7.6 2.7 0.2 0.2 0.7 26.4 7.4 17.3
## [295] 11.8 10.6 3.6 1.5 4.8 6.6 7.2 0.0 4.3 1.7 0.1 0.0 0.0 0.0
## [309] 0.0 0.0 0.0 6.5 0.0 8.0 0.0 1.2 6.6 0.0 6.5 40.4 2.7 0.0
## [323] 0.0 0.0 0.2 0.0 9.1 0.2 0.0 0.0 0.0 0.0 0.9 16.6 0.8 0.0
## [337] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 8.9
## [351] 0.8 3.4 4.6 0.0 0.0 8.1 0.0 0.9 5.0 0.0 0.0 0.0 0.0 0.0
## [365] 0.0 0.0 0.0 9.9 1.7 5.2 0.0 0.0 0.0 0.3 0.0 0.0 0.0 0.3
## [379] 0.1 0.0 0.0 0.4 0.0 0.0 0.0 13.0 19.5 0.2 0.0 0.0 8.5 22.1
## [393] 0.0 0.0 13.3 4.7 3.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [407] 1.6 1.6 3.0 8.8 11.5 1.2 0.0 0.0 0.0 0.0 8.9 0.9 12.2 0.7

```


##	[421]	7.2	7.2	0.2	0.0	0.0	0.0	0.0	4.2	0.3	16.1	24.4	2.5	0.0	0.2
##	[435]	11.7	0.0	1.7	0.0	0.6	0.0	4.3	13.5	0.1	0.0	0.0	0.0	0.0	0.0
##	[449]	0.0	0.2	3.4	1.4	5.0	0.1	0.0	0.0	10.9	8.4	10.7	0.0	2.4	6.3
##	[463]	28.6	3.6	0.0	0.0	0.0	4.3	0.0	5.5	0.0	0.0	0.0	13.4	0.0	0.4
##	[477]	2.2	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.1
##	[491]	0.0	1.8	0.0	0.0	0.0	0.0	0.0	27.7	0.2	0.0	0.0	0.0	0.0	0.0
##	[505]	0.0	0.0	0.8	0.0	7.6	0.0	0.0	0.0	0.0	4.3	7.6	0.0	0.0	0.0
##	[519]	0.0	0.0	0.6	11.2	0.7	19.7	0.0	0.0	0.0	1.1	1.9	4.8	0.0	15.6
##	[533]	21.1	2.3	0.0	0.0	0.0	2.8	2.6	0.0	0.0	0.0	0.0	8.4	6.0	10.7
##	[547]	4.0	30.6	4.2	0.0	0.0	0.0	1.5	18.4	13.2	0.0	2.4	0.4	1.7	0.0
##	[561]	1.7	0.9	0.0	5.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	3.9	6.0	0.0
##	[575]	0.0	2.0	5.1	9.3	0.0	5.1	0.0	3.4	2.4	7.2	0.0	0.0	12.9	5.1
##	[589]	16.9	14.4	11.1	5.3	4.9	9.8	1.0	2.8	0.0	0.0	0.8	0.0	11.9	1.9
##	[603]	0.2	0.0	13.1	3.0	0.0	16.8	9.6	3.7	0.3	0.8	8.8	0.4	1.8	1.2
##	[617]	0.0	0.0	1.8	0.0	0.0	22.9	8.0	3.6	0.6	0.0	0.0	9.6	0.0	0.0
##	[631]	0.7	0.1	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.5
##	[645]	0.0	0.0	0.0	0.0	0.0	6.6	0.0	28.1	0.0	9.2	0.0	0.0	0.0	2.6
##	[659]	0.2	0.0	0.0	4.4	3.8	0.3	0.0	10.1	3.9	0.2	0.0	14.8	8.1	8.0
##	[673]	0.0	0.0	0.0	0.0	0.4	8.3	1.1	3.7	0.0	0.0	0.6	0.9	3.5	0.4
##	[687]	0.0	3.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[701]	0.0	0.0	0.0	9.2	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7	0.0
##	[715]	0.0	15.9	8.6	6.0	0.1	0.6	1.2	0.1	0.0	2.8	1.7	8.4	0.0	0.0
##	[729]	0.0	0.0	0.0	0.0	22.9	2.3	0.0	7.8	5.6	0.0	0.0	0.6	0.0	0.0
##	[743]	0.0	12.7	5.2	5.4	43.6	24.1	0.2	0.6	0.0	0.0	0.7	0.0	0.0	0.0
##	[757]	6.8	4.5	0.0	0.2	0.1	0.0	0.0	0.0	4.9	33.9	20.9	1.7	29.1	16.0
##	[771]	0.0	0.0	25.1	0.0	2.1	0.8	9.7	0.2	0.0	50.8	2.4	0.0	0.0	0.0
##	[785]	0.0	0.0	0.0	20.5	19.0	0.0	2.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0
##	[799]	0.0	0.0	0.0	43.9	0.0	0.4	0.9	0.0	3.1	4.2	10.3	2.8	0.0	0.0
##	[813]	0.0	0.0	0.2	21.0	3.5	0.1	0.0	0.0	0.0	0.0	0.5	6.6	8.4	1.7
##	[827]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	20.6	2.8	2.1
##	[841]	0.2	0.0	2.2	4.6	0.0	3.7	0.0	0.0	2.2	7.5	6.5	15.6	6.4	0.0
##	[855]	0.0	0.9	36.1	0.0	0.9	0.0	0.0	1.0	1.4	0.0	0.0	0.3	0.0	0.0
##	[869]	0.0	0.8	14.8	12.1	12.2	0.0	0.0	1.2	5.7	6.0	4.8	5.2	8.3	12.4
##	[883]	1.6	0.8	0.0	0.0	0.0	0.4	0.0	0.0	6.1	7.3	26.8	0.4	4.9	10.5
##	[897]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	4.2	1.5	0.5	0.6
##	[911]	0.6	0.0	0.4	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[925]	0.0	0.0	0.0	0.0	1.0	7.1	10.2	0.0	10.3	1.4	5.6	0.3	0.0	1.5
##	[939]	0.2	0.1	4.3	0.7	10.1	16.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0
##	[953]	0.8	0.0	1.9	20.2	1.7	0.0	0.1	7.0	13.1	0.1	1.7	9.1	12.3	10.5
##	[967]	0.0	0.0	6.8	0.5	11.2	1.6	0.0	0.2	2.2	0.0	0.0	0.0	0.0	0.0
##	[981]	0.0	0.0	0.0	0.0	3.4	2.9	0.0	0.0	0.1	23.3	0.0	0.0	0.0	0.0
##	[995]	0.0	0.0	0.0	0.0	2.2	0.8	14.1	1.7	1.2	0.0	0.0	0.0	0.3	2.6
##	[1009]	0.0	0.0	0.0	0.0	0.9	0.0	0.1	14.8	1.9	5.5	0.0	13.2	8.6	2.1
##	[1023]	29.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1
##	[1037]	23.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[1051]	2.4	6.0	0.0	15.4	0.0	5.0	1.1	0.0	0.0	0.0	0.8	0.0	0.0	0.0
##	[1065]	0.0	0.0	0.0	0.0	0.3	3.8	3.8	4.3	0.0	0.0	5.9	2.5	9.7	0.2
##	[1079]	2.5	12.7	6.1	0.0	0.0	1.4	0.0	0.0	1.5	16.7	0.1	7.2	0.1	1.8
##	[1093]	1.2	0.0	0.2	0.2	0.0	13.5	0.0	0.0	3.6	2.2	0.0	0.0	0.0	0.0
##	[1107]	0.0	0.0	0.0	4.3	20.9	4.6	28.6	43.3	12.5	0.3	4.9	2.6	3.5	0.0
##	[1121]	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	2.5
##	[1135]	12.1	0.2	0.0	1.8	0.0	0.1	0.0	0.6	10.0	0.1	0.0	0.0	8.3	4.1
##	[1149]	0.0	2.8	0.0	5.7	7.5	1.3	0.6	0.0	0.0	1.1	0.2	0.0	0.0	0.0
##	[1163]	0.0	0.0	6.9	7.7	15.8	1.9	1.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

## [1177]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.4	0.0	0.0	0.0
## [1191]	0.0	0.0	12.4	0.0	26.6	7.3	4.3	4.6	6.1	0.0	3.4	0.0	9.4	0.9
## [1205]	0.0	0.0	0.0	0.0	9.6	4.0	11.1	8.2	0.0	0.0	0.0	0.0	0.0	0.0
## [1219]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	7.3	20.2
## [1233]	13.3	3.0	0.4	0.1	0.0	1.0	0.0	0.0	0.9	0.0	0.0	4.0	7.0	3.6
## [1247]	6.0	10.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0
## [1261]	0.1	0.0	0.1	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [1275]	0.0	0.0	0.0	17.8	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.8	0.0	19.5
## [1289]	0.0	0.0	0.0	10.0	1.3	0.3	0.0	1.0	18.7	0.0	0.0	0.0	0.0	0.0
## [1303]	6.6	0.4	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.7	8.9	0.8	2.1
## [1317]	0.0	0.0	0.0	27.3	4.1	0.0	0.0	3.1	6.0	2.3	12.1	0.8	0.0	0.0
## [1331]	1.3	0.0	0.0	0.0	0.0	0.0	7.2	20.6	6.0	0.1	0.0	0.0	2.6	0.3
## [1345]	0.0	1.1	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.2	0.0	0.0	0.3	0.0
## [1359]	0.0	0.0	0.0	0.0	1.6	11.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.0
## [1373]	2.3	1.9	0.2	0.9	22.3	3.0	36.7	1.1	0.0	0.0	0.0	2.5	0.0	0.0
## [1387]	0.0	0.8	0.0	0.0	6.9	0.1	0.0	0.0	5.1	0.0	0.0	0.0	0.0	30.0
## [1401]	0.0	0.0	0.0	0.0	13.9	0.0	4.1	0.0	0.0	0.0	6.0	0.3	0.0	0.0
## [1415]	0.0	0.0	0.0	1.8	2.8	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0
## [1429]	0.0	0.0	0.0	0.0	0.0	0.0	7.0	1.1	5.6	0.0	0.0	0.0	0.0	0.0
## [1443]	0.0	0.0	0.0	0.0	34.5	8.8	6.3	8.9	0.0	0.0	1.1	0.0	0.8	0.0
## [1457]	0.0	22.6	14.5	0.3	1.8	14.3	5.9	0.0	0.0	0.0	0.0	0.0	3.1	14.4
## [1471]	0.0	33.9	2.4	1.4	0.0	0.0	0.0	0.5	0.0	7.2	6.2	1.0	31.4	32.4
## [1485]	0.0	3.6	22.8	1.2	0.3	0.0	0.0	25.5	15.8	0.9	0.6	0.7	6.3	0.0
## [1499]	0.0	0.2	0.6	0.0	0.0	0.0	0.0	2.4	2.0	2.6	1.0	0.0	0.0	0.0
## [1513]	0.0	1.4	0.0	0.3	0.0	5.0	10.6	0.0	2.9	4.9	0.0	0.0	0.0	0.0
## [1527]	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0
## [1541]	0.0	4.0	0.2	2.3	4.0	0.0	0.0	11.4	26.6	6.7	2.3	3.1	11.1	0.0
## [1555]	0.0	0.0	10.0	1.2	0.0	21.3	20.3	9.8	0.4	0.0	0.0	0.0	16.5	0.0
## [1569]	10.9	1.8	0.6	0.0	0.0	0.0	9.4	6.0	10.0	3.7	0.0	0.0	0.0	5.4
## [1583]	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	3.1	0.0	0.0
## [1597]	1.1	0.0	0.0	9.3	10.8	4.3	0.1	1.0	0.0	0.0	0.0	0.0	3.8	29.6
## [1611]	1.6	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [1625]	0.0	0.0	0.0	1.9	4.6	0.0	0.0	0.0	11.0	0.2	0.0	0.0	0.0	0.0
## [1639]	0.3	0.0	0.0	0.0	1.4	0.0	2.7	12.2	0.0	0.0	0.0	0.0	0.0	0.0
## [1653]	0.0	0.0	0.0	3.5	0.0	2.6	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [1667]	0.0	0.0	0.0	4.3	1.5	0.6	5.4	12.4	1.7	0.0	2.7	4.6	0.0	1.5
## [1681]	0.0	13.8	3.2	5.5	5.2	6.1	0.0	0.0	7.9	10.7	11.6	0.0	0.5	3.2
## [1695]	2.8	0.0	4.1	5.0	30.1	10.4	4.5	7.3	6.2	0.0	1.3	0.0	0.0	2.1
## [1709]	15.3	0.0	0.0	0.0	18.2	0.4	3.6	0.0	0.0	27.7	8.3	5.5	0.0	2.7
## [1723]	1.2	16.2	2.1	4.7	35.4	8.4	15.7	1.1	0.0	0.0	0.6	8.1	7.7	0.0
## [1737]	1.3	5.5	0.0	1.4	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.7	6.4	4.6
## [1751]	2.5	0.3	0.0	2.5	1.4	13.0	1.3	0.0	0.0	0.0	0.0	0.8	0.0	0.0
## [1765]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [1779]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
## [1793]	18.2	0.6	8.9	0.2	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0
## [1807]	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.2
## [1821]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	10.2	1.3	6.7
## [1835]	0.2	5.6	10.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [1849]	0.0	0.0	13.0	0.0	3.7	5.9	7.4	10.0	0.7	0.0	0.0	12.9	0.0	0.0
## [1863]	0.0	0.5	0.0	0.0	0.0	0.0	0.0	12.2	0.0	0.0	0.0	2.8	0.0	0.0
## [1877]	0.0	1.8	1.2	0.4	0.1	0.0	16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.9
## [1891]	0.1	5.7	0.0	0.0	1.4	1.2	5.5	0.0	0.0	3.4	49.0	21.8	2.2	1.3
## [1905]	0.0	0.0	17.7	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.6	15.4	0.0
## [1919]	0.0	0.0	0.0	0.0	0.0	9.5	10.8	2.8	6.4	6.1	0.0	0.0	24.9	1.3

##	[1933]	13.6	0.0	0.1	1.1	1.6	0.6	25.4	6.4	0.0	0.0	2.7	0.0	0.0	0.0
##	[1947]	1.1	9.4	10.0	5.4	0.0	0.4	14.5	7.6	1.4	1.5	2.3	2.8	4.9	0.0
##	[1961]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	3.1	0.0	3.7	3.4	41.5
##	[1975]	13.5	9.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0
##	[1989]	0.0	0.0	0.0	2.8	0.2	0.0	13.7	5.7	0.0	1.5	18.6	8.8	0.3	3.2
##	[2003]	0.0	0.4	15.7	0.0	0.0	3.1	0.0	0.0	0.2	25.5	1.8	0.0	0.0	0.0
##	[2017]	0.0	7.5	1.3	0.0	0.0	1.4	9.1	4.6	5.0	0.0	0.0	0.0	8.8	4.4
##	[2031]	0.0	0.0	0.0	0.0	11.4	0.5	0.0	16.0	4.4	1.0	3.5	0.0	0.0	0.0
##	[2045]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.1	0.0	0.0
##	[2059]	0.0	0.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2073]	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	12.9	0.0	0.0	0.0	0.0	1.0
##	[2087]	0.4	0.0	0.0	30.3	0.2	0.0	12.2	0.0	0.0	0.0	0.0	0.0	20.1	5.4
##	[2101]	0.1	3.1	0.7	8.6	4.3	0.0	1.6	0.5	0.0	0.0	0.0	0.0	0.1	41.2
##	[2115]	2.5	1.2	4.6	1.9	0.0	0.0	0.0	0.7	9.5	38.7	19.5	0.1	0.0	0.0
##	[2129]	0.0	0.9	6.3	12.9	4.0	0.0	0.0	5.8	8.8	6.4	6.7	8.1	2.4	0.4
##	[2143]	1.0	3.2	0.3	0.4	0.0	6.2	0.4	17.0	1.7	0.0	0.0	0.3	15.0	0.0
##	[2157]	6.4	4.4	0.0	0.0	0.0	0.1	10.3	0.0	0.0	0.0	0.6	16.0	0.0	0.0
##	[2171]	0.0	0.0	0.0	0.3	0.7	3.1	0.1	30.5	0.1	0.0	0.0	0.1	0.0	0.0
##	[2185]	0.0	0.0	0.0	0.0	0.0	0.0	16.6	1.8	0.0	0.0	0.0	4.0	6.6	0.7
##	[2199]	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	4.5	0.8	1.0
##	[2213]	1.1	0.0	0.0	11.5	2.0	0.5	0.4	2.6	0.0	0.0	0.6	0.2	0.0	0.0
##	[2227]	0.0	0.6	0.0	0.0	0.0	0.0	0.0	3.8	1.0	0.0	7.0	4.3	2.2	0.0
##	[2241]	6.4	0.0	4.0	15.4	0.0	0.0	0.6	0.0	0.1	0.0	4.3	1.2	0.0	0.1
##	[2255]	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.8	0.4
##	[2269]	0.0	0.0	0.0	4.6	0.0	5.7	0.0	1.4	37.5	2.1	0.1	1.9	0.7	43.5
##	[2283]	0.6	1.9	0.0	2.4	0.0	47.7	52.7	4.9	2.3	1.7	9.4	0.9	0.0	0.4
##	[2297]	0.0	0.0	0.0	5.2	0.0	8.8	11.1	0.1	0.1	32.5	1.0	8.3	0.0	0.5
##	[2311]	8.5	0.2	0.0	0.0	0.3	1.7	1.1	5.8	1.9	0.7	1.9	0.0	0.0	0.3
##	[2325]	0.7	0.0	0.1	0.1	0.4	0.0	7.5	6.1	0.2	0.0	0.0	1.8	0.0	0.0
##	[2339]	0.0	0.4	8.6	1.4	11.6	0.2	0.0	0.0	2.4	0.4	4.5	2.3	8.7	0.0
##	[2353]	0.0	5.3	1.5	8.9	7.8	0.6	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0
##	[2367]	5.0	0.0	0.0	0.0	15.2	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2381]	0.0	0.0	0.0	0.0	0.7	14.0	33.7	7.1	2.9	20.8	12.0	0.0	0.0	0.0
##	[2395]	0.1	0.0	7.7	14.1	4.6	0.2	0.1	0.0	1.6	2.3	4.2	0.7	0.4	11.3
##	[2409]	0.0	0.0	0.3	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	17.9
##	[2423]	16.6	0.1	0.0	0.0	0.0	0.0	0.2	8.0	10.2	3.5	0.0	42.8	11.5	0.6
##	[2437]	4.9	0.0	9.0	27.5	3.6	2.2	0.0	0.0	0.0	0.0	0.0	1.0	7.1	10.2
##	[2451]	0.0	0.0	5.6	4.8	2.6	0.3	1.8	11.1	12.4	0.0	0.0	12.9	3.2	0.0
##	[2465]	0.1	0.2	0.0	0.0	14.6	7.3	0.0	35.2	4.8	3.5	3.7	4.9	16.1	2.8
##	[2479]	27.1	0.2	4.7	0.0	3.9	1.4	0.0	1.4	2.7	5.3	0.2	5.3	6.5	2.8
##	[2493]	12.0	18.5	0.5	0.0	5.5	0.3	14.5	0.6	0.0	1.4	2.0	7.9	3.2	12.5
##	[2507]	10.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
##	[2521]	0.1	0.0	3.5	0.5	1.0	0.6	0.1	2.1	8.5	20.3	7.9	3.0	6.6	33.2
##	[2535]	4.4	0.0	5.2	0.3	0.0	6.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2549]	1.6	5.1	0.0	0.0	1.5	0.0	14.5	8.8	17.2	0.2	11.4	0.5	0.0	1.8
##	[2563]	1.5	0.0	0.4	0.0	8.3	0.2	0.7	0.0	6.0	0.1	0.0	0.0	0.0	0.0
##	[2577]	3.0	3.0	0.0	0.0	5.7	7.0	0.0	0.0	17.2	0.1	0.0	0.0	0.0	0.0
##	[2591]	0.0	0.0	0.0	4.0	15.6	3.0	3.3	0.0	15.5	1.3	9.7	1.0	0.0	0.0
##	[2605]	0.6	4.3	7.2	3.1	11.9	1.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	1.9
##	[2619]	0.0	0.2	5.5	0.0	0.0	0.0	0.0	6.4	2.8	1.8	6.8	0.0	1.9	0.2
##	[2633]	0.0	0.8	0.0	0.0	0.0	3.1	0.0	0.0	0.0	12.6	5.5	0.0	0.0	0.0
##	[2647]	6.8	0.0	1.9	0.0	0.0	0.6	9.1	0.0	19.9	1.8	9.8	10.4	1.8	3.2
##	[2661]	5.1	1.1	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	1.6	0.3	13.2
##	[2675]	0.0	1.0	0.0	0.0	0.5	0.4	0.0	0.0	0.0	0.1	5.7	0.5	1.0	0.3

##	[2689]	9.9	2.5	0.1	7.5	11.7	0.0	9.9	9.7	6.6	1.8	0.0	0.0	0.0	0.0
##	[2703]	0.0	0.0	0.0	0.0	0.0	2.9	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2717]	0.0	0.0	0.0	2.4	6.4	0.0	0.0	0.0	26.6	7.6	0.0	0.6	0.0	0.8
##	[2731]	0.0	0.0	0.0	0.0	0.0	5.5	0.0	14.1	0.0	1.4	0.0	10.7	0.0	0.0
##	[2745]	0.0	0.0	0.0	0.6	3.0	38.5	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2759]	0.0	1.2	1.8	0.6	9.0	0.0	0.4	0.0	4.1	11.1	4.2	0.0	0.0	0.9
##	[2773]	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	1.2	4.5	18.0	3.3	1.7
##	[2787]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	30.5	9.1	1.2	3.3	16.0
##	[2801]	0.2	0.0	4.2	11.4	0.0	0.0	2.1	16.7	0.4	0.0	0.1	0.1	0.0	0.0
##	[2815]	0.2	1.2	0.0	0.0	0.7	15.1	5.4	3.2	0.0	27.9	9.5	0.7	16.6	3.0
##	[2829]	3.2	0.0	22.2	13.6	0.2	2.3	0.3	0.0	16.2	24.3	0.0	0.0	0.0	0.0
##	[2843]	0.0	0.0	0.0	0.0	5.8	9.3	0.0	0.5	0.4	11.6	0.2	0.0	0.0	0.0
##	[2857]	7.1	0.2	7.1	7.4	0.1	1.6	2.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0
##	[2871]	0.0	2.2	46.2	0.0	0.0	6.9	29.3	25.9	0.0	0.0	0.0	0.0	0.0	0.0
##	[2885]	0.3	0.0	0.0	0.0	0.0	0.0	0.0	9.6	14.9	6.7	33.9	5.3	3.0	2.1
##	[2899]	4.8	17.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	1.6	11.9	0.7	0.0	0.0
##	[2913]	12.7	1.0	0.0	0.0	0.0	0.0	17.8	20.6	5.1	19.4	4.9	8.6	0.0	0.0
##	[2927]	2.8	5.6	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2941]	0.0	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[2955]	0.0	0.0	1.4	1.8	0.0	6.3	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
##	[2969]	0.0	0.0	0.0	0.3	0.0	0.0	0.0	2.1	1.6	0.0	0.1	0.0	0.0	0.0
##	[2983]	3.1	0.5	0.0	0.0	7.6	7.8	5.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0
##	[2997]	0.0	0.0	0.0	0.0	5.8	0.6	0.0	0.0	0.0	8.8	0.0	9.5	0.6	12.5
##	[3011]	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.1	0.0	0.0	8.3
##	[3025]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	8.9
##	[3039]	5.0	0.0	6.8	22.1	32.4	2.4	3.3	1.5	0.2	4.9	12.8	1.6	0.0	0.0
##	[3053]	3.2	0.0	0.0	0.0	7.3	29.9	5.8	4.0	0.0	2.0	2.6	0.0	12.8	3.9
##	[3067]	0.0	0.1	0.0	4.1	0.0	9.1	0.0	0.0	2.8	0.3	0.0	7.7	0.0	0.0
##	[3081]	0.0	1.1	0.0	0.0	0.0	0.0	21.7	0.1	0.0	3.2	0.0	0.0	0.0	0.0
##	[3095]	0.0	0.0	0.0	0.0	45.0	0.0	0.0	43.6	3.9	0.8	0.6	0.0	1.4	6.7
##	[3109]	12.8	21.0	3.0	0.0	11.2	19.0	0.5	10.4	6.6	2.8	0.2	0.0	0.0	2.1
##	[3123]	12.1	1.6	0.1	0.0	0.6	13.4	0.4	0.0	0.0	18.1	0.0	3.4	0.4	0.0
##	[3137]	0.0	0.0	0.0	11.5	3.9	0.1	0.0	0.0	16.0	0.0	3.8	2.5	0.0	0.0
##	[3151]	0.0	0.0	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3165]	0.0	4.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
##	[3179]	10.4	0.0	0.0	0.0	0.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3193]	0.0	0.0	8.6	0.0	11.9	0.2	6.9	0.0	0.0	0.0	0.3	0.0	0.1	13.0
##	[3207]	0.6	0.0	2.6	3.1	0.0	0.0	0.0	0.0	0.0	0.1	26.1	0.0	0.0	0.0
##	[3221]	11.0	3.1	8.1	2.4	0.0	2.2	4.0	3.7	0.3	0.0	0.0	0.0	0.1	10.2
##	[3235]	10.8	0.2	0.0	1.2	15.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3249]	0.0	11.4	0.0	3.2	0.2	0.1	0.0	54.8	8.2	5.6	0.1	0.0	0.0	0.0
##	[3263]	0.0	15.2	2.1	0.0	0.0	0.0	21.4	3.3	1.2	4.4	33.0	4.3	0.7	0.7
##	[3277]	0.0	0.0	34.4	0.0	2.2	3.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	2.1
##	[3291]	0.0	0.0	0.0	6.0	0.0	1.4	0.0	0.0	0.0	0.0	15.2	46.4	0.0	3.6
##	[3305]	1.7	0.9	6.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	3.2	0.0	0.0
##	[3319]	2.8	3.4	0.0	6.9	0.0	0.0	0.4	0.0	0.0	0.0	3.2	4.0	2.9	0.0
##	[3333]	3.8	0.1	0.8	0.0	1.7	0.0	0.0	0.1	0.0	0.0	0.0	0.6	0.0	8.1
##	[3347]	11.9	0.4	0.0	0.0	0.3	9.3	0.0	0.6	0.2	0.0	11.2	10.4	10.8	0.1
##	[3361]	0.0	0.4	0.0	1.8	0.5	0.4	0.0	0.0	0.0	0.0	0.6	0.0	0.8	21.6
##	[3375]	28.1	8.5	0.2	0.0	4.7	4.1	0.0	0.0	0.0	0.0	0.0	0.0	9.7	0.1
##	[3389]	0.7	0.0	2.5	6.5	28.4	5.6	0.0	0.0	1.9	0.0	0.0	0.0	12.7	1.7
##	[3403]	1.3	0.0	0.0	0.0	0.0	0.0	0.0	30.5	0.6	0.5	0.0	0.1	0.0	0.0
##	[3417]	0.0	0.7	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.7	9.9
##	[3431]	0.0	0.0	0.0	0.0	1.3	0.2	0.0	0.0	43.7	11.5	6.3	0.0	0.0	0.0

##	[3445]	0.0	1.5	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	7.4
##	[3459]	0.0	0.0	0.0	0.0	0.0	6.9	0.0	22.6	0.4	9.6	0.0	0.0	0.0	0.0
##	[3473]	14.5	16.2	0.0	8.7	0.0	6.9	0.0	8.6	0.7	0.0	0.0	0.0	0.0	0.0
##	[3487]	13.3	0.9	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	3.9	3.0	0.0	0.0
##	[3501]	0.0	0.0	1.4	0.0	0.0	0.0	0.0	1.9	0.1	11.1	0.9	4.0	0.0	1.1
##	[3515]	2.1	0.8	0.0	9.8	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	47.6	0.0
##	[3529]	0.0	27.6	15.3	0.0	0.0	0.0	18.7	2.8	0.0	2.2	9.3	2.2	2.0	15.2
##	[3543]	0.5	0.0	0.0	0.0	0.0	0.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4
##	[3557]	32.8	27.8	5.3	0.0	17.6	11.0	2.4	1.4	0.1	1.4	2.2	5.9	10.0	16.6
##	[3571]	0.0	0.0	18.9	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	12.2
##	[3585]	14.3	12.4	0.1	0.0	0.0	13.0	0.0	8.1	1.1	0.5	0.0	0.0	0.0	0.0
##	[3599]	0.7	13.2	0.9	0.0	9.7	0.0	14.6	5.0	0.2	5.4	0.0	13.7	15.5	12.5
##	[3613]	0.0	4.1	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	10.1	2.7	3.6	1.1
##	[3627]	0.0	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3641]	23.3	13.1	6.2	12.8	0.0	3.4	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.5
##	[3655]	0.0	0.0	0.0	0.0	0.0	21.4	1.9	8.8	3.2	6.3	1.9	0.0	0.0	19.4
##	[3669]	0.0	0.9	3.9	3.1	0.9	12.0	1.5	2.1	0.0	0.0	0.0	0.0	0.0	0.0
##	[3683]	19.9	6.9	0.0	7.1	5.2	0.1	4.9	1.6	0.0	0.0	3.9	0.0	20.8	11.9
##	[3697]	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.0	10.1	13.8	5.1	0.0	0.3
##	[3711]	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.6	0.0	0.0	0.0	0.0	2.0	9.5
##	[3725]	0.6	0.0	0.0	0.1	11.8	0.0	0.1	0.0	3.1	1.0	0.0	0.0	1.8	0.0
##	[3739]	0.0	0.4	0.0	0.0	0.0	2.4	0.0	1.0	6.7	5.0	0.0	0.1	0.3	0.0
##	[3753]	0.0	28.1	0.0	21.6	0.0	8.6	37.9	6.0	0.3	0.0	13.2	0.2	0.0	0.0
##	[3767]	0.0	0.1	6.7	11.0	0.0	0.0	0.0	0.1	0.0	1.8	5.1	0.0	3.9	6.7
##	[3781]	9.3	12.8	3.8	0.0	29.6	2.5	0.0	2.7	0.8	4.1	0.0	0.0	0.0	1.0
##	[3795]	2.8	5.2	5.6	0.0	1.7	2.1	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3809]	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	9.1	42.2	18.0	0.0	0.0	0.0
##	[3823]	0.0	0.9	0.2	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
##	[3837]	1.5	2.9	13.5	0.0	0.0	27.8	15.2	0.0	0.0	3.7	0.0	0.0	0.0	0.0
##	[3851]	6.4	53.7	17.0	1.6	0.0	0.1	3.0	18.5	2.9	0.0	0.0	0.3	0.0	8.5
##	[3865]	0.1	0.0	0.7	9.8	9.6	7.0	0.0	0.0	7.5	21.6	5.1	0.0	6.3	27.0
##	[3879]	15.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.4	8.6
##	[3893]	0.0	4.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	10.2	1.2	2.4	0.1	0.0
##	[3907]	0.0	0.0	0.0	11.0	0.0	0.7	7.1	0.8	0.0	0.0	3.6	0.2	0.0	0.0
##	[3921]	0.0	0.0	0.0	0.3	5.1	1.2	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[3935]	0.0	0.0	0.1	0.5	21.3	3.2	3.5	2.4	3.9	0.0	0.0	0.0	0.0	0.0
##	[3949]	0.0	0.0	1.0	0.0	0.0	0.0	0.0	25.6	0.9	0.0	0.0	2.8	0.0	11.3
##	[3963]	1.4	0.0	0.0	0.0	4.5	0.3	0.0	0.0	0.0	1.7	0.0	0.0	11.7	0.0
##	[3977]	13.3	20.1	0.0	0.0	0.0	2.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	14.4
##	[3991]	2.4	0.0	0.8	13.2	0.0	0.0	0.2	0.0	2.3	11.3	23.2	1.2	2.1	0.4
##	[4005]	4.2	18.5	6.0	5.3	1.8	8.8	0.3	0.0	0.0	0.0	0.0	0.0	6.5	5.9
##	[4019]	1.7	2.5	0.0	0.0	1.8	0.0	0.0	0.1	1.9	0.0	0.0	0.0	1.4	0.0
##	[4033]	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	1.1	0.0	1.8	0.8	0.0	4.1
##	[4047]	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0	0.0	0.8	3.7	0.0	0.9	0.0
##	[4061]	0.0	0.0	0.0	16.0	1.1	0.0	0.0	0.0	0.8	39.4	0.0	0.0	0.3	12.1
##	[4075]	46.6	13.0	0.0	0.1	0.0	9.3	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
##	[4089]	0.0	2.6	8.2	0.0	2.5	1.5	2.1	0.0	0.9	0.1	0.0	0.0	5.4	0.0
##	[4103]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	5.7	10.0
##	[4117]	0.0	2.9	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1	2.3
##	[4131]	0.0	0.0	0.0	0.2	7.7	0.0	0.0	0.0	9.3	11.9	0.6	1.0	0.5	0.0
##	[4145]	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	15.6	17.5	6.1	2.5	1.8
##	[4159]	0.0	1.1	6.4	6.3	0.0	0.0	0.0	2.0	0.0	2.7	4.9	0.2	0.0	0.0
##	[4173]	6.1	0.0	0.0	0.0	0.8	0.0	1.8	4.1	0.2	0.0	0.0	0.2	0.0	12.0
##	[4187]	15.0	0.0	0.0	13.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

##	[4201]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.2	4.5	13.6	0.0	1.5
##	[4215]	15.3	2.3	7.9	1.6	0.0	0.0	24.6	20.1	13.5	0.1	2.1	0.0	0.0	0.0
##	[4229]	0.1	0.0	7.1	11.5	0.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[4243]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[4257]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.5	0.1	6.6	1.6
##	[4271]	1.5	0.0	11.9	0.1	0.0	0.0	0.0	18.3	17.1	3.2	3.5	7.0	2.0	0.2
##	[4285]	0.0	5.1	11.2	1.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
##	[4299]	0.0	0.3	1.8	9.3	0.2	0.0	0.0	0.0	5.9	2.1	0.1	0.4	0.0	0.1
##	[4313]	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	1.4	8.0	0.4	0.0	0.0	0.0
##	[4327]	0.0	4.1	0.8	17.7	11.8	2.0	4.9	0.3	0.0	0.2	7.7	0.0	0.0	0.0
##	[4341]	19.7	1.0	0.2	26.3	8.0	11.1	0.6	0.2	5.8	0.0	0.0	17.3	1.4	0.0
##	[4355]	0.0	0.5	7.4	2.2	0.0	21.0	20.6	14.2	10.0	0.0	0.0	3.8	2.6	0.0
##	[4369]	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	10.9	1.5	17.4	11.2	8.0
##	[4383]	12.8	59.2	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	2.0	0.0	3.7	0.2
##	[4397]	0.0	0.0	0.1	17.9	33.1	9.1	4.1	3.9	1.1	2.2	1.2	0.0	0.0	10.4
##	[4411]	14.1	4.1	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	3.3	7.5	6.9	0.3
##	[4425]	0.0	0.0	0.2	0.0	0.0	2.1	4.0	16.8	0.5	8.9	0.6	0.0	0.0	14.8
##	[4439]	5.4	0.2	2.2	2.6	0.0	0.0	6.8	1.5	1.8	0.2	1.9	1.2	7.8	1.7
##	[4453]	6.0	3.0	2.0	35.2	1.0	0.0	0.0	0.0	0.0	0.0	8.9	0.7	0.0	0.8
##	[4467]	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	2.2	4.0	1.2	0.0	0.0	0.0
##	[4481]	0.0	31.6	61.6	6.8	2.0	2.6	0.0	0.1	4.3	0.0	0.6	5.8	0.0	0.0
##	[4495]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
##	[4509]	0.0	0.0	0.0	7.7	1.9	0.3	0.0	0.0	0.0	2.1	1.0	0.0	4.3	5.4
##	[4523]	6.6	0.6	2.2	0.0	0.0	0.0	3.3	0.0	2.9	0.0	0.0	13.6	0.0	0.0
##	[4537]	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	20.7	1.5
##	[4551]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[4565]	0.0	10.0	1.0	2.5	0.0	0.6	0.3	0.0	0.0	0.8	0.0	2.3	4.6	0.0
##	[4579]	9.9	0.0	0.0	0.0	22.1	7.4	3.6	8.7	0.8	0.3	0.0	2.0	5.4	7.0
##	[4593]	8.5	1.1	1.8	0.0	0.0	0.0	0.0	14.3	0.3	0.0	0.0	0.0	5.0	6.8
##	[4607]	19.4	5.1	0.1	0.1	0.0	0.0	33.3	2.7	1.2	8.4	0.3	2.9	0.0	0.0
##	[4621]	3.0	0.7	1.9	4.9	7.5	6.3	16.8	7.5	0.0	4.7	6.8	0.0	0.2	1.7
##	[4635]	2.4	7.1	14.4	7.7	1.5	0.0	0.0	0.4	2.7	19.2	0.4	0.0	0.0	0.0
##	[4649]	9.6	2.9	0.0	0.0	0.0	0.0	16.1	0.0	0.0	1.1	0.0	0.0	0.0	0.0
##	[4663]	0.0	0.0	0.0	0.0	3.8	7.5	0.0	0.0	1.1	0.3	0.0	0.0	69.1	2.5
##	[4677]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	3.0	0.0	1.5	1.6
##	[4691]	0.1	0.0	0.0	19.4	1.3	0.0	0.0	2.9	9.4	11.8	0.0	0.0	0.0	0.0
##	[4705]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.4	0.0	0.0	10.9	0.1	0.7
##	[4719]	5.8	0.0	0.0	0.0	5.7	21.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
##	[4733]	0.4	1.1	0.0	0.0	0.0	13.7	3.5	0.1	4.1	0.0	5.9	11.8	3.6	0.5
##	[4747]	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	8.6	0.0	9.3
##	[4761]	3.4	0.8	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	8.0	0.0	0.0
##	[4775]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.1	1.4	0.0
##	[4789]	2.1	0.1	0.9	0.2	1.8	14.5	11.2	14.3	0.0	0.1	0.0	0.0	6.2	0.0
##	[4803]	0.0	1.0	42.5	0.5	0.0	15.6	22.9	2.5	1.4	0.0	0.0	0.0	1.7	17.0
##	[4817]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.0	0.0	2.6	0.3
##	[4831]	0.0	0.0	17.4	2.2	6.8	18.7	25.5	10.5	0.0	0.0	0.0	0.0	4.6	0.5
##	[4845]	0.0	11.4	0.2	6.8	4.8	32.0	5.2	0.3	0.0	0.0	0.0	0.0	1.0	0.0
##	[4859]	14.4	26.0	0.0	0.0	8.9	19.2	0.0	0.0	0.0	0.0	0.3	10.4	8.9	0.0
##	[4873]	0.0	2.5	6.3	2.2	0.0	0.0	0.0	0.0	0.4	0.0	6.4	1.2	0.2	0.0
##	[4887]	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	12.1	0.1	0.0	0.1	1.6	7.1
##	[4901]	10.2	5.3	0.0	0.0	6.9	1.3	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0
##	[4915]	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	7.2
##	[4929]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.8	0.1	0.0	0.0	0.0
##	[4943]	0.0	0.0	0.0	8.9	0.0	0.0	0.0	0.0	0.0	37.1	0.0	0.0	6.0	0.3

## [4957]	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	69.1	0.0	0.0	11.8	0.0	0.0	13.2
## [4971]	2.8	1.0	1.8	1.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [4985]	0.0	0.1	0.0	5.7	0.1	1.6	1.0	0.2	0.0	4.5	8.7	0.0	0.0	0.0	5.2
## [4999]	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	8.2
## [5013]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.2	9.3	0.1	0.7	0.0	0.0
## [5027]	0.0	7.3	2.5	0.0	2.3	19.5	0.1	0.0	0.2	0.8	0.1	8.5	0.0	0.0	0.0
## [5041]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	5.2	0.2	2.8	0.0
## [5055]	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	1.7	0.0	9.1	6.1	0.4	0.3	0.0
## [5069]	7.6	0.3	0.2	0.0	6.5	0.0	0.0	0.0	0.0	20.5	0.1	4.9	2.4	7.6	0.0
## [5083]	3.9	0.0	3.2	0.0	0.0	0.0	21.3	0.0	0.0	0.0	21.8	2.0	2.6	0.0	0.0
## [5097]	0.0	0.0	0.0	0.0	0.0	0.0	9.4	11.0	0.1	0.0	9.7	0.0	0.0	0.0	0.0
## [5111]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.7	0.3	0.0	0.0	8.3	0.0	0.0
## [5125]	7.3	14.2	0.2	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.4	2.1	0.0	0.0	0.0
## [5139]	0.6	0.0	0.0	0.0	0.0	20.5	8.2	2.2	0.0	0.0	0.0	0.0	0.2	0.7	0.0
## [5153]	8.9	9.5	5.5	1.9	0.2	0.2	0.0	0.0	6.5	8.0	0.6	0.0	0.0	0.0	0.0
## [5167]	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5181]	0.0	0.0	0.0	0.0	0.0	7.6	31.4	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
## [5195]	0.0	0.0	0.0	5.5	11.2	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0
## [5209]	0.0	0.0	0.0	0.7	0.0	0.0	0.0	7.5	0.0	0.0	0.0	1.5	0.7	0.2	0.0
## [5223]	17.4	3.8	0.0	0.0	34.7	1.9	1.2	0.4	2.4	0.0	0.0	6.4	0.2	7.1	0.0
## [5237]	0.0	5.3	0.0	2.6	0.0	0.0	0.0	0.0	0.1	16.8	12.9	0.4	5.7	22.7	0.0
## [5251]	1.6	6.7	0.2	0.0	0.0	18.9	18.5	16.0	7.2	15.8	3.4	9.1	13.8	0.2	0.0
## [5265]	0.0	0.8	0.5	0.8	18.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0
## [5279]	1.2	19.1	5.9	0.0	0.0	0.0	0.0	0.0	6.1	0.0	23.8	7.7	22.5	0.0	0.0
## [5293]	0.3	0.8	3.3	7.6	1.1	2.2	0.0	14.7	0.0	18.3	11.1	0.0	0.3	0.0	0.0
## [5307]	0.0	0.0	0.0	0.1	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5321]	17.2	0.1	0.0	0.0	0.0	3.3	16.9	22.1	3.1	2.0	7.8	0.1	0.0	0.0	0.0
## [5335]	0.0	0.7	0.0	35.5	3.5	0.4	1.9	0.0	0.0	0.0	0.0	1.9	9.0	0.1	0.0
## [5349]	1.4	0.0	1.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5363]	1.9	1.5	0.7	16.4	9.3	3.4	1.2	14.3	0.2	1.9	0.3	0.0	0.0	0.5	0.0
## [5377]	0.0	3.1	5.4	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.8	1.4	0.0	0.0
## [5391]	0.0	3.5	0.0	2.9	0.0	0.0	0.6	14.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0
## [5405]	0.0	1.4	11.0	22.2	0.0	0.0	0.0	6.7	0.0	0.0	3.9	25.5	0.0	0.0	0.0
## [5419]	0.0	14.5	0.2	0.0	0.0	21.0	0.0	0.0	0.0	0.0	11.2	0.0	10.7	0.7	0.0
## [5433]	1.7	2.1	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5447]	0.0	0.0	1.3	0.0	0.0	0.0	1.1	14.0	0.0	0.1	0.0	4.5	4.8	0.0	0.0
## [5461]	0.0	0.0	0.6	2.9	5.4	0.6	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5475]	0.0	0.0	0.0	0.0	1.8	0.0	11.5	0.0	0.0	0.0	0.0	0.0	5.1	3.4	0.0
## [5489]	0.5	0.0	0.0	0.0	8.6	0.9	15.1	1.9	0.0	0.8	0.1	0.0	0.4	0.0	0.0
## [5503]	0.0	0.0	0.0	0.0	0.0	10.7	0.0	4.3	0.0	0.0	0.0	0.3	12.7	1.3	0.0
## [5517]	0.0	0.0	0.0	6.7	9.9	3.9	1.6	9.8	0.0	12.5	16.8	5.1	4.2	0.0	0.0
## [5531]	14.0	0.7	0.0	0.0	0.0	6.8	3.3	35.7	21.7	0.7	5.2	0.0	0.0	0.0	0.0
## [5545]	0.1	22.2	0.0	2.5	18.1	0.0	0.0	11.6	0.0	7.7	0.0	0.0	0.0	0.6	0.0
## [5559]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5573]	0.0	0.0	4.4	0.0	19.7	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [5587]	0.0	0.0	0.0	0.0	0.0	0.0	0.6	12.2	0.0	2.6	0.0	0.0	0.0	0.0	0.0
## [5601]	0.0	0.0	0.0	0.0	14.2	0.1	0.0	0.0	0.0	27.3	0.6	0.0	6.3	1.3	0.0
## [5615]	0.0	5.3	9.6	11.9	1.2	7.8	0.0	0.0	2.8	0.0	0.0	23.1	35.6	7.1	0.0
## [5629]	1.3	0.0	2.0	0.0	0.9	0.0	0.0	0.0	4.8	0.4	5.6	1.1	0.0	0.0	0.0
## [5643]	0.0	0.0	0.0	0.0	4.6	8.1	0.0	0.0	0.0	0.0	2.3	1.7	1.3	0.0	0.0
## [5657]	0.9	5.0	0.0	0.3	0.0	0.0	0.0	0.0	0.9	3.2	1.4	0.0	0.0	0.0	0.0
## [5671]	29.9	6.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5	20.8	0.0	0.0	0.0	0.9	0.0
## [5685]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	0.0	0.4	0.0	0.0	0.0
## [5699]	0.0	0.0	0.0	0.0	0.0	13.7	4.1	13.0	12.5	23.0	7.1	13.1	0.9	0.1	0.0

##	[5713]	3.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.3	12.9	0.0	0.0	0.0
##	[5727]	0.7	0.0	0.0	0.0	0.0	0.0	2.1	9.4	1.8	10.0	5.3	1.7	12.4	1.1
##	[5741]	0.0	0.0	15.3	6.0	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2
##	[5755]	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	3.2	0.0
##	[5769]	0.0	0.0	0.0	0.0	3.8	1.2	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0
##	[5783]	0.0	0.0	0.2	2.9	0.2	0.0	0.0	0.0	0.0	0.0	7.8	0.0	30.3	2.1
##	[5797]	10.7	0.9	0.0	0.0	0.0	0.0	0.0	5.1	5.4	15.4	0.5	10.2	2.7	0.2
##	[5811]	0.0	0.5	0.0	7.6	4.3	11.9	6.0	4.8	0.0	0.0	0.0	0.0	0.0	0.5
##	[5825]	0.4	1.9	0.0	0.0	0.0	13.6	0.0	0.0	0.0	3.1	21.1	8.5	5.0	0.3
##	[5839]	0.7	1.7	5.6	0.3	0.0	0.9	0.0	18.6	0.0	0.0	0.4	4.9	0.0	0.0
##	[5853]	0.0	0.0	3.7	0.0	0.0	0.0	0.0	14.0	0.2	0.0	0.0	0.1	0.0	4.5
##	[5867]	0.0	0.0	0.0	18.3	14.7	0.0	0.0	0.0	0.0	0.0	0.0	13.7	30.2	3.3
##	[5881]	3.4	3.5	21.1	0.2	0.0	0.0	0.0	0.0	4.3	4.2	10.2	0.3	0.2	0.0
##	[5895]	9.3	0.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.3	0.5	0.0
##	[5909]	0.0	0.0	0.5	7.3	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0
##	[5923]	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	19.4	0.0	0.0	1.3	2.7	6.5
##	[5937]	1.2	0.0	0.0	0.0	0.0	1.2	0.0	0.0	21.3	0.0	1.6	0.0	2.1	0.0
##	[5951]	0.0	0.0	0.0	0.0	43.5	0.3	0.0	0.7	4.1	0.0	0.8	0.0	0.0	0.0
##	[5965]	1.1	0.0	0.0	0.0	1.8	0.0	4.2	6.2	0.0	0.0	0.0	0.0	0.0	0.1
##	[5979]	48.7	7.5	0.3	2.6	0.4	3.7	0.0	0.0	8.3	0.0	4.3	0.6	8.0	15.7
##	[5993]	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.5	0.0	0.6	0.0	0.0	0.0	0.0
##	[6007]	0.0	0.0	0.0	1.7	13.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.5
##	[6021]	0.0	14.5	1.5	7.1	4.4	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
##	[6035]	3.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	7.2	23.9
##	[6049]	0.1	1.2	3.3	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
##	[6063]	0.8	1.1	6.9	1.0	10.6	6.1	1.5	0.0	0.0	14.2	2.0	0.0	0.0	0.0
##	[6077]	0.0	0.0	54.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[6091]	0.8	17.8	4.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0
##	[6105]	2.6	29.5	1.6	44.4	5.3	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[6119]	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	9.1	0.7	0.0	0.0	0.0
##	[6133]	5.3	22.5	2.9	0.0	5.6	4.6	6.0	0.0	0.0	18.3	10.5	6.1	1.0	0.0
##	[6147]	0.0	0.0	0.0	0.0	0.4	13.5	15.0	1.6	6.8	1.6	0.0	0.0	2.7	1.2
##	[6161]	0.0	0.0	0.0	2.0	0.2	2.0	0.0	0.0	0.0	16.8	1.7	0.0	0.0	0.0
##	[6175]	5.3	4.5	1.6	0.0	2.5	0.0	0.0	1.3	1.7	49.6	1.7	3.2	4.7	3.8
##	[6189]	17.3	3.8	0.9	30.8	0.6	4.0	11.3	4.7	5.6	4.3	2.7	0.2	0.0	0.0
##	[6203]	0.9	8.0	3.8	6.7	14.0	0.1	0.0	3.9	25.0	0.8	5.7	0.0	2.6	3.1
##	[6217]	19.9	8.8	0.1	0.0	0.0	0.0	0.0	0.8	5.2	0.2	0.0	0.0	6.8	0.0
##	[6231]	0.0	0.0	0.0	0.0	13.1	0.0	20.1	0.0	0.0	27.9	0.4	0.0	0.0	0.0
##	[6245]	0.0	0.0	0.0	0.0	4.6	0.4	4.7	18.4	1.0	2.2	0.0	0.0	12.1	5.9
##	[6259]	0.1	0.0	3.8	0.6	0.0	0.0	15.2	1.2	1.3	0.5	4.9	4.0	0.0	0.0
##	[6273]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	5.9	11.7	0.0	0.0	0.0	11.6
##	[6287]	0.5	6.0	0.0	0.0	0.0	1.0	0.0	0.7	0.0	0.0	0.0	1.8	0.0	0.0
##	[6301]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	33.1	0.4	0.0
##	[6315]	0.5	0.0	4.7	19.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
##	[6329]	0.6	0.0	0.0	0.0	0.4	10.4	0.0	0.0	8.8	12.3	0.0	10.0	0.0	0.0
##	[6343]	0.0	0.0	0.0	0.0	0.0	2.9	9.4	4.5	1.0	15.3	1.0	14.4	3.3	0.0
##	[6357]	7.4	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.7	0.0	0.0
##	[6371]	0.0	0.0	16.1	11.4	0.0	0.2	0.0	0.0	0.0	0.0	0.7	20.4	4.5	2.5
##	[6385]	0.0	1.1	10.8	2.9	5.7	31.9	0.0	0.0	0.0	0.0	0.4	14.9	0.7	0.0
##	[6399]	0.0	0.0	0.0	0.0	0.0	47.9	0.0	0.0	0.0	0.0	0.0	0.4	1.7	0.2
##	[6413]	4.8	16.4	2.9	2.2	21.4	1.4	3.0	0.3	0.5	3.4	0.0	11.3	0.0	6.1
##	[6427]	5.2	0.0	0.0	0.0	0.2	0.0	0.0	1.8	0.0	2.9	0.0	0.0	0.0	0.0
##	[6441]	0.0	0.0	7.7	21.9	1.1	0.0	0.0	0.0	0.1	3.4	0.0	4.0	2.2	0.0
##	[6455]	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	2.3	0.0	0.0	1.2	1.5	0.0

## [6469]	0.0	4.6	0.4	17.8	4.0	0.0	1.2	4.2	0.0	4.7	14.1	1.2	0.0	6.2
## [6483]	14.1	12.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.5	0.0	10.9
## [6497]	4.3	8.6	0.0	0.0	0.0	1.4	0.3	0.7	8.0	1.3	0.0	0.0	0.0	0.0
## [6511]	0.0	0.0	0.0	0.0	0.0	0.6	1.2	4.1	0.0	3.7	27.8	0.0	0.0	0.0
## [6525]	0.0	7.4	2.1	0.0	0.0	23.7	5.2	0.0	9.2	1.3	0.0	3.9	6.2	0.0
## [6539]	20.7	19.2	2.3	0.0	0.0	14.1	0.0	10.7	18.6	2.7	0.2	0.0	0.0	0.0
## [6553]	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [6567]	1.6	11.0	1.7	0.0	0.3	0.0	9.4	3.1	13.0	32.5	0.0	12.7	0.3	0.8
## [6581]	0.3	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
## [6595]	4.8	4.0	0.0	5.0	0.9	31.9	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [6609]	2.2	1.6	15.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	8.0	4.5
## [6623]	11.5	0.0	0.0	6.2	0.1	7.0	0.4	0.0	6.6	5.8	0.0	0.0	0.0	0.0
## [6637]	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	45.9	1.3	0.0	0.0	4.2
## [6651]	0.0	0.0	0.0	0.2	0.0	7.2	0.0	1.3	4.2	0.0	0.0	0.6	1.6	0.0
## [6665]	7.9	4.2	0.2	22.3	13.5	10.2	2.5	0.0	0.0	4.8	0.0	0.0	0.2	0.0
## [6679]	0.0	0.0	0.0	0.0	2.8	2.7	7.5	8.6	6.7	4.5	8.7	6.8	0.0	4.3
## [6693]	10.0	24.2	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [6707]	0.0	19.4	0.0	16.4	0.1	0.0	0.0	0.0	6.2	0.0	1.2	0.0	0.0	11.3
## [6721]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.5	6.5	0.0	2.7	0.0	0.0
## [6735]	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	14.6	9.1	4.9	0.7
## [6749]	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
## [6763]	0.0	0.0	0.2	18.8	0.0	0.6	1.6	0.0	2.6	26.6	0.0	0.0	22.4	1.4
## [6777]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3
## [6791]	20.0	10.6	1.7	41.3	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4
## [6805]	12.6	16.7	0.0	31.2	15.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	13.0
## [6819]	0.6	3.3	0.0	0.0	0.1	0.0	0.0	0.7	1.7	2.4	5.5	1.1	0.0	0.0
## [6833]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	5.8	0.1	1.1	5.0	6.5
## [6847]	2.0	3.0	11.4	0.0	0.0	0.0	0.0	40.9	0.7	0.3	23.9	6.4	2.9	0.6
## [6861]	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.3	1.4	0.0	0.0
## [6875]	0.0	0.0	0.1	29.8	0.4	13.1	4.7	0.0	0.0	8.7	10.3	5.0	48.2	0.0
## [6889]	0.4	0.0	25.8	24.6	4.7	9.7	0.0	0.0	8.8	0.0	0.0	0.0	0.0	2.4
## [6903]	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	6.6	0.0	0.0	0.0
## [6917]	0.0	0.0	0.0	0.0	0.0	0.0	7.1	4.4	0.0	0.3	0.2	5.4	2.5	1.8
## [6931]	0.0	0.0	5.0	0.0	7.2	4.7	0.0	6.1	7.2	0.0	0.0	0.0	0.0	0.2
## [6945]	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	7.9
## [6959]	0.0	0.0	5.4	16.3	0.2	0.0	0.7	0.0	1.2	0.0	0.0	0.0	0.0	1.0
## [6973]	0.0	5.6	1.3	0.0	0.0	0.0	0.0	3.7	11.8	0.2	0.5	0.0	6.8	0.0
## [6987]	3.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [7001]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	3.3	11.2	0.0	0.0	0.0	0.0
## [7015]	1.3	15.7	0.0	6.4	6.2	0.0	0.0	0.0	0.0	0.0	2.7	11.7	0.4	11.5
## [7029]	0.0	0.0	0.0	0.0	0.4	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
## [7043]	2.4	0.4	0.0	18.6	7.8	0.0	8.5	0.0	0.0	1.5	1.5	11.9	8.8	12.3
## [7057]	0.6	13.1	0.0	0.0	0.0	0.0	16.9	11.0	19.9	3.4	10.4	22.7	6.7	0.0
## [7071]	0.0	0.1	0.0	0.0	0.0	0.3	0.0	12.1	1.1	8.5	7.8	1.3	0.0	4.6
## [7085]	0.0	0.0	0.0	0.0	0.0	18.1	0.0	0.0	2.5	12.8	1.8	0.2	3.6	9.1
## [7099]	0.0	45.1	2.0	1.0	22.9	22.2	4.0	0.0	0.0	9.2	5.1	0.4	0.0	0.0
## [7113]	0.0	11.9	4.6	6.7	31.3	1.0	0.1	0.0	20.6	6.3	3.9	9.4	0.0	0.0
## [7127]	0.0	0.0	0.0	0.0	0.0	11.5	1.0	6.9	0.0	26.5	10.1	0.0	0.0	0.0
## [7141]	0.0	19.2	0.0	0.0	6.6	4.5	0.0	0.0	0.0	15.5	7.9	78.5	7.7	2.9
## [7155]	0.0	0.1	0.0	0.1	0.6	4.2	0.8	0.0	3.3	1.4	21.7	0.0	0.0	0.0
## [7169]	0.9	0.0	0.0	26.4	87.3	5.8	0.0	0.0	14.0	1.4	0.5	0.0	4.1	3.2
## [7183]	0.0	0.0	0.0	15.9	2.9	0.0	0.0	2.4	8.4	1.9	0.0	0.0	0.0	0.0
## [7197]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	12.6	16.1	0.0	0.0
## [7211]	21.1	0.0	0.0	0.0	0.0	27.6	11.4	21.1	1.0	0.0	0.3	3.0	0.0	0.6

```

## [7225] 0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.0 0.0 0.0 4.6 7.0 11.2 0.0
## [7239] 0.0 0.0 0.0 0.0 2.5 1.1 0.0 0.0 19.9 50.0 0.0 5.9 1.1 0.0
## [7253] 1.7 0.0 3.9 0.0 0.0 6.2 0.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [7267] 0.8 0.0 0.0 0.0 0.0 14.7 6.9 2.2 5.8 0.8 6.4 0.0 0.0 0.0
## [7281] 12.6 23.7 0.0 0.0 0.0 4.5 0.1 0.3 5.7 0.0 0.0 0.0 2.3 0.0
## [7295] 0.0 5.0 1.5 0.0 0.0 0.0 1.3 0.8 1.5 7.6 2.0 0.5 0.0 0.0
## [7309] 0.0 0.0 38.8 0.5 14.5 13.4 2.3 0.0 0.0 0.3 1.4 3.7 2.4 0.0
## [7323] 0.0 5.6 0.0 0.0 0.0 0.0 0.5 1.5 0.1 0.0 0.0 0.0 11.8 15.7
## [7337] 2.1 1.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [7351] 0.0 4.3 7.8 0.1 0.0 0.0 0.0 0.0 0.0 2.1 0.7 0.0 0.0 0.0
## [7365] 2.1 0.0 0.8 0.0 2.3 5.2 0.0 0.0 3.9 1.5 12.8 5.8 0.9 7.4
## [7379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [7393] 0.1 0.0 0.0 0.0 0.0 0.0 1.4 0.0 1.5 0.2 0.0 0.0 0.0 0.9
## [7407] 0.0 0.0 0.0 0.7 1.8 4.3 0.0 0.0 3.5 0.0 2.5 5.2 2.7 0.0
## [7421] 2.2 19.3 0.0 12.2 1.8 0.0 0.0 0.6 0.0 0.0 17.9 5.0 0.0 31.5
## [7435] 7.1 4.7 0.0 0.4 0.0 1.5 0.0 0.5 3.8 6.4 0.0 4.0 12.1 0.0
## [7449] 0.3 7.2 0.0 0.6 0.0 0.0 6.1 9.6 0.0 4.9 8.1 0.2 1.7 0.0
## [7463] 0.0 0.0 0.0 0.0 2.2 10.0 5.4 0.9 0.0 0.0 11.7 0.0 0.0 0.0
## [7477] 0.0 0.0 0.0 1.7 0.0 0.0 0.0 0.0 0.0 0.0 0.1 20.2 0.0 1.5
## [7491] 11.5 0.0 8.3 8.7 0.0 0.0 0.9 29.8 0.3 2.9 1.3 7.6 8.0 4.5
## [7505] 0.0 0.0 0.0 0.0 0.3 0.2 0.0 0.0 0.0 0.1 3.4 0.9 1.9 21.6
## [7519] 0.2 0.2 0.0 0.0 0.0 1.0 0.0 16.2 0.9 0.0 0.3 1.9 0.5 0.0
## [7533] 0.0 0.0 0.0 0.0 0.1 15.7 0.5 0.0 0.0 0.0 3.9 0.0 3.1 21.4
## [7547] 4.0 0.0 1.4 18.7 6.5 0.0 12.4 9.1 5.8 1.1 0.0 0.0 0.0 0.1
## [7561] 0.0 6.3 6.3 17.3 0.0 0.0 1.5 2.2 2.5 0.0 0.0 0.0 1.3 25.7
## [7575] 2.4 0.0 2.8 37.8 12.0 1.7 0.5 0.0 3.3 0.0 0.0 6.6 0.7 2.1
## [7589] 0.0 0.0 0.0 0.0 3.2 0.5 0.0 0.0 0.0 0.0 0.0 0.1 3.6 3.2
## [7603] 0.0 0.0 0.0 0.0 0.0 6.8 20.9 1.5 0.0 0.0 0.0 0.0 0.0 0.0
## [7617] 0.0 0.0 12.7 2.3 0.0 0.0 0.0 0.2 0.8 0.0 7.7 15.2 3.5 0.0
## [7631] 0.0 0.0 15.3 21.6 3.4 3.9 0.0 0.0 0.0 0.0 0.0 0.0 1.0 31.0
## [7645] 5.5 0.0 0.0 5.2 0.0 0.0 0.0 0.0 0.0 0.0 29.8 0.0 0.0 1.3
## [7659] 1.5 0.0 0.0 0.0 1.8 12.6 0.0 0.0 2.9 4.8 0.0 0.0 0.0 0.0
## [7673] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 2.0 5.1 0.0 0.0
## [7687] 0.0 2.3 0.0 0.0 0.0 0.0 55.8 43.9 0.0 0.0 0.0 0.0 0.0 4.4
## [7701] 0.0 5.7 20.9 0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.7 0.0 2.8
## [7715] 0.1 0.0 0.0 0.0 0.0 23.4 2.0 0.0 1.6 0.5 0.0 0.0 0.0 0.5
## [7729] 0.0 0.0 6.4 0.0 0.0 0.0 0.0 0.0 0.7 0.0 0.0 0.0 0.0 0.0
## [7743] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 28.7 2.7 0.0 0.0 0.0 5.9 6.3
## [7757] 0.0 1.1 14.6 0.0 28.1 0.2 3.1 14.6 7.6 4.7 8.0 0.2 1.4 0.3
## [7771] 1.7 0.0 0.0 0.0 0.0 3.4 12.5 9.4 6.1 0.0 0.0 1.2 4.4 10.2
## [7785] 18.0 0.6 2.4 0.0 1.5 1.3 1.1 0.0 0.0 0.0 3.6 11.1 10.1 8.0
## [7799] 5.6 0.2 8.3 3.9 5.0 2.0 0.0 0.4 0.0 0.0 0.0 0.0 1.7 0.0
## [7813] 6.1 6.6 0.0 0.2 0.6 0.0 0.0
##
## attr(,"class")
## [1] "gpd.fit"

```

```

nu_hat <- gpd_fit$mle[2]
beta_hat <- gpd_fit$mle[1]
p_exceed <- mean(df$precip > th, na.rm=TRUE)
return_level_pot <- function(T_years){
  p_annual <- 1/(T_years*365)
  if(abs(nu_hat) < 1e-6){
    z <- th + beta_hat * log(p_exceed / p_annual)

```

```

} else {
  z <- th + (beta_hat/nu_hat) * ( (p_exceed / p_annual)^(nu_hat) - 1 )
}
return(z)
}
cat('Approx 10-year return level (precip):', return_level_pot(10), '\n')

```

```
## Approx 10-year return level (precip): 71.34499
```

7 5. Declustering

```

decluster_runs <- function(dates, series, threshold, run_length_days = 3){
  idx_exceed <- which(series > threshold)
  if(length(idx_exceed)==0) return(integer(0))
  groups <- cumsum(c(1, diff(idx_exceed) > run_length_days))
  keep_idx <- tapply(idx_exceed, groups, function(idxs) idxs[which.max(series[idxs])])
  return(as.integer(unlist(keep_idx)))
}
kept <- decluster_runs(df$date, df$precip, th, run_length_days = 2)
cat('After declustering (run=2 days) kept exceedances:', length(kept), '\n')

```

```
## After declustering (run=2 days) kept exceedances: 342
```

8 6. Tail dependence and scatter

```

q_p <- quantile(df$precip, 0.95, na.rm=TRUE)
q_d <- quantile(df$discharge, 0.95, na.rm=TRUE)
cond_prob <- mean(df$discharge > q_d & df$precip > q_p, na.rm=TRUE) / mean(df$precip > q_p, na.rm=TRUE)
cat('Empirical P(discharge>q_d | precip>q_p) at 95% quantiles:', cond_prob, '\n')

```

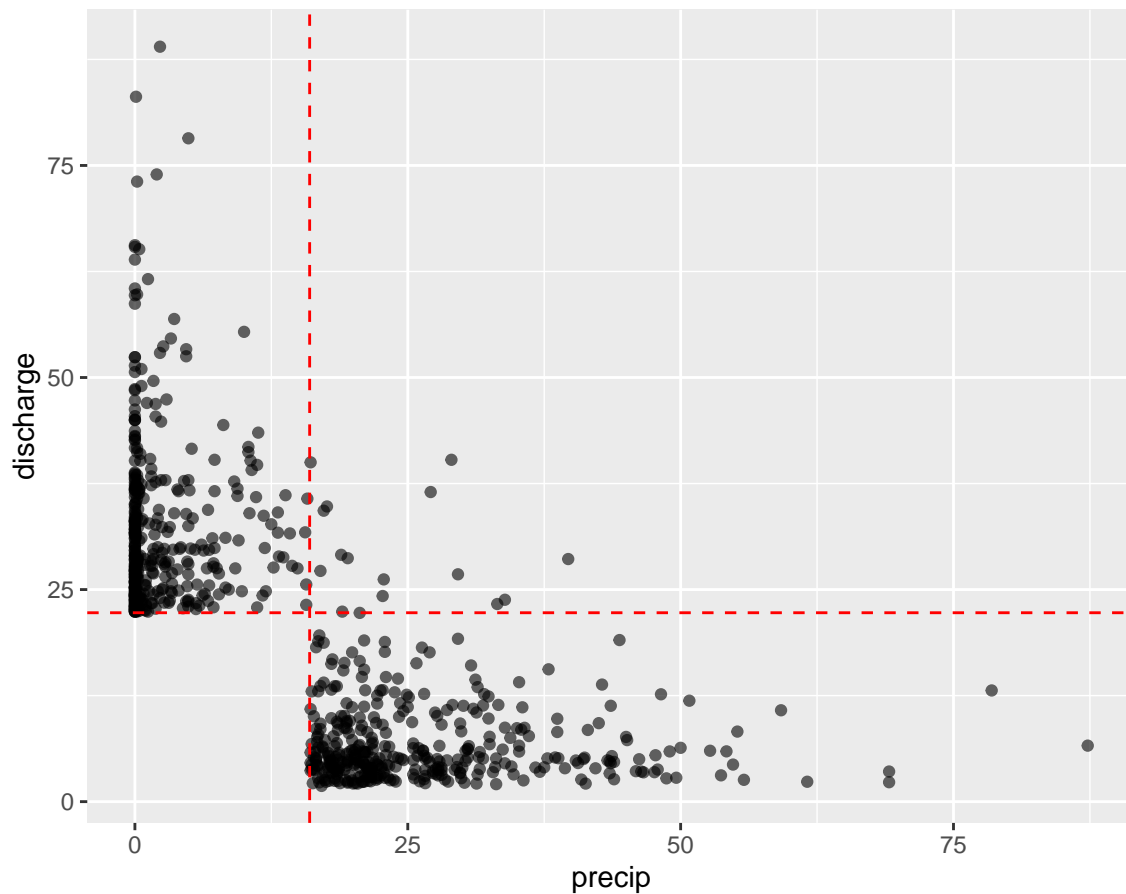
```
## Empirical P(discharge>q_d | precip>q_p) at 95% quantiles: 0.03836317
```

```

top_df <- df %>% filter(precip > q_p | discharge > q_d)
print(ggplot(top_df, aes(x=precip, y=discharge)) + geom_point(alpha=0.6) +
  geom_hline(yintercept = q_d, color='red', linetype='dashed') +
  geom_vline(xintercept = q_p, color='red', linetype='dashed') +
  labs(title='Scatter of precip vs discharge (top quantiles)'))

```

Scatter of precip vs discharge (top quantiles)



9 7. Extreme causality tests

```
helpers_path <- file.path('practical_1', 'JuroExtremes.R')
if(file.exists(helpers_path)){
  source(helpers_path)
} else stop('JuroExtremes.R not found')

common_idx <- which(!is.na(df$discharge) & !is.na(df$precip))
xseries <- df$precip[common_idx]
yseries <- df$discharge[common_idx]

res_list <- list()
for(lag_f in 0:3){
  res <- Extreme_causality_test(xseries, yseries, z = NULL, lag_future = lag_f, p_value_computation = F)
  res_list[[as.character(lag_f)]] <- res
  cat('Lag', lag_f, ': ', as.character(res$output), 'CTC=', res$CTC, 'baseline=', res$baseline, '\n')
}
```

```
## Lag 0 : No causality CTC= 0.5188186 baseline= 0.3215919
## Lag 1 : No causality CTC= 0.4792721 baseline= 0.2583037
```

```
## Lag 2 : Evidence of causality CTC= 0.8267955 baseline= 0.3338323
## Lag 3 : Evidence of causality CTC= 0.8771856 baseline= 0.3926592
```

```
res_rev <- list()
for(lag_f in 0:3){
  res2 <- Extreme_causality_test(yseries, xseries, z = NULL, lag_future = lag_f, p_value_computation = 1)
  res_rev[[as.character(lag_f)]] <- res2
  cat('Reverse Lag', lag_f, ': ', as.character(res2$output), '\n')
}
```

```
## Reverse Lag 0 : No causality
## Reverse Lag 1 : No causality
## Reverse Lag 2 : No causality
## Reverse Lag 3 : No causality
```

```
saveRDS(list(gev_fit=gev_fit, gpd_fit=gpd_fit, causality_precip_to_discharge = res_list, causality_rev = res_rev), 'causality.rds')
```

10 Takeaways

- Discharge annual maxima were modeled with a GEV; model parameters and a 100-year return level are reported above.
- Precipitation extremes (POT) were modeled with a GPD using the 95% quantile as threshold; an approximate 10-year return level is provided.
- Declustering reduces clusters of exceedances; the retained exceedances are used for inference.
- Empirical tail-dependence at 95% shows a small conditional probability that large precip coincides with large discharge in the same day.
- The provided extreme-causality test suggests evidence of causality from precipitation to discharge at some positive lags (see outputs); the reverse direction showed no causality in this analysis.

11 Rendering to PDF

This RMarkdown is set to produce a PDF via the `pdflatex` engine. To knit to PDF from R you can run:

```
rmarkdown::render('practical_1/Practical1_report.Rmd', output_format = 'pdf_document')
```

Note: producing PDF requires a working LaTeX installation (MiKTeX, TeX Live, MacTeX). A convenient lightweight option inside R is to install TinyTeX:

```
if(!requireNamespace('tinytex', quietly = TRUE)) install.packages('tinytex')
tinytex::install_tinytex()
```

If LaTeX is not available, you can render HTML instead and convert to PDF later (or use the RStudio knit button which often helps resolve path issues):

```
rmarkdown::render('practical_1/Practical1_report.Rmd', output_format = 'html_document')
```