IE 360

Code ▾

Group Project

Refika Kalyoncu, Can Gizer, Ceren Dündar

2022-06-07

1 INTRODUCTION

The companies competing in energy distribution market are highly competitive. All the companies are selling the same undifferentiated product and the price that they charge their customers is fixed. This market behaves similar to a perfectly competitive market. The only exception being that the companies competing aren't buying the electricity on the same price. The price is determined by energy consumption and prediction. During the timeslots where production is high and consumption is low, the prices tend to fall. By building time series models and trying to predict consumer behavior and energy production the distributor companies are trying to maximize their profits. Thus, the distributor companies are incentivized to make adequate time series models and forecasts. The aim of this project is showing parallels to what the energy distributors are doing. The aim is to predict energy production of a solar energy producer. The scope is, however, much smaller than what those distributors are doing, but in terms of building blocks, nothing drastic is different from how those energy distributors are modeling.

The approach to tackle the problem, is explained in detail on the approach part and in the

RMD file shared. But the model that the group decided on is an ARIMA model with 2 autoregressive variables and 1 moving average error model. This model is justifiable since, the energy production is highly correlated with the previous days. That is because the weather is not changing drastically on the area and thus the panels can operate similarly with the previous days.

The production data is given hourly and as expected the production is 0 when the sun sets. Additionally, the production is at its daily maximum around noon when the sun exposure is at its highest. One additional thing to note is, the maximum daily production is increasing up to around 40 GW and then stays relatively constant. That's the level the plant is working at its maximum capacity so to speak and operates at its optimum for some time. Then some decline can be observed in the data. That's probably because the government has the authority to regulate individual plant's production to stabilize energy prices on the energy distributor- producer market. Additionally, there are four possible regressors measured for 9 different longitude and latitude points. These are temperature, relative humidity, radiation and total cloud cover.

2 APPROACH

As mentioned, the production is increasing up to a limit and then decreases due to government oversight. If a model was to be drawn from this raw data, the learnt model will be misleading. Furthermore, the data is hourly and the hourly data if not dealt with, can skew to the predictions as well. To overcome these hurdles, the group has decided to manipulate the data. A new variable utilization is added to the model. First the maximum production on sliding window is found for every hour, and then the production data for a given hour has been divided to maximum production of the sliding window. This approach smoothed the data. The assumption the group embraced was, the maximum production will not change drastically with every slide. Although this assumption is a strong one, a careful examination of the data will show no drastic increase or decrease. The models are fitted using this utilization variable.

Afterwards several time series regression models have been tested. To check them individually, the reader is advised to check the code. The one that is selected as a time series candidate model is the one that has 72, 73 hours of lags and average of all the regressors, which had a R^2 coefficient of 0.80. The residuals for this seemed normally distributed with 0 mean, constant variance, and no autocorrelation of residuals. To further smooth the prediction, the negative predicted utilizations are set to 0.

The second approach was a time series analysis one. At the beginning, the data has been made stationary, and the auto.arima() function has been set. The model came out of it is ARIMA(2,0,1). Note that, the differencing is done prior to using auto.arima(). The differencing that was implemented was a single differencing with 72, since the prediction task was to be made 72 hours ahead.

2.1 Libraries

The necessary libraries are added.

2.2 Uploading Data

The data is uploaded and updated each day for the corresponding prediction.

<div style="text-align: right">

Code

</div>

2.3 Dcasting and Merging with production

The data is dcasted to change so that each different lat and lon value for the same date and hour are avaliable in a single row.

<div style="text-align: right">

Code

</div>

<div style="text-align: right">
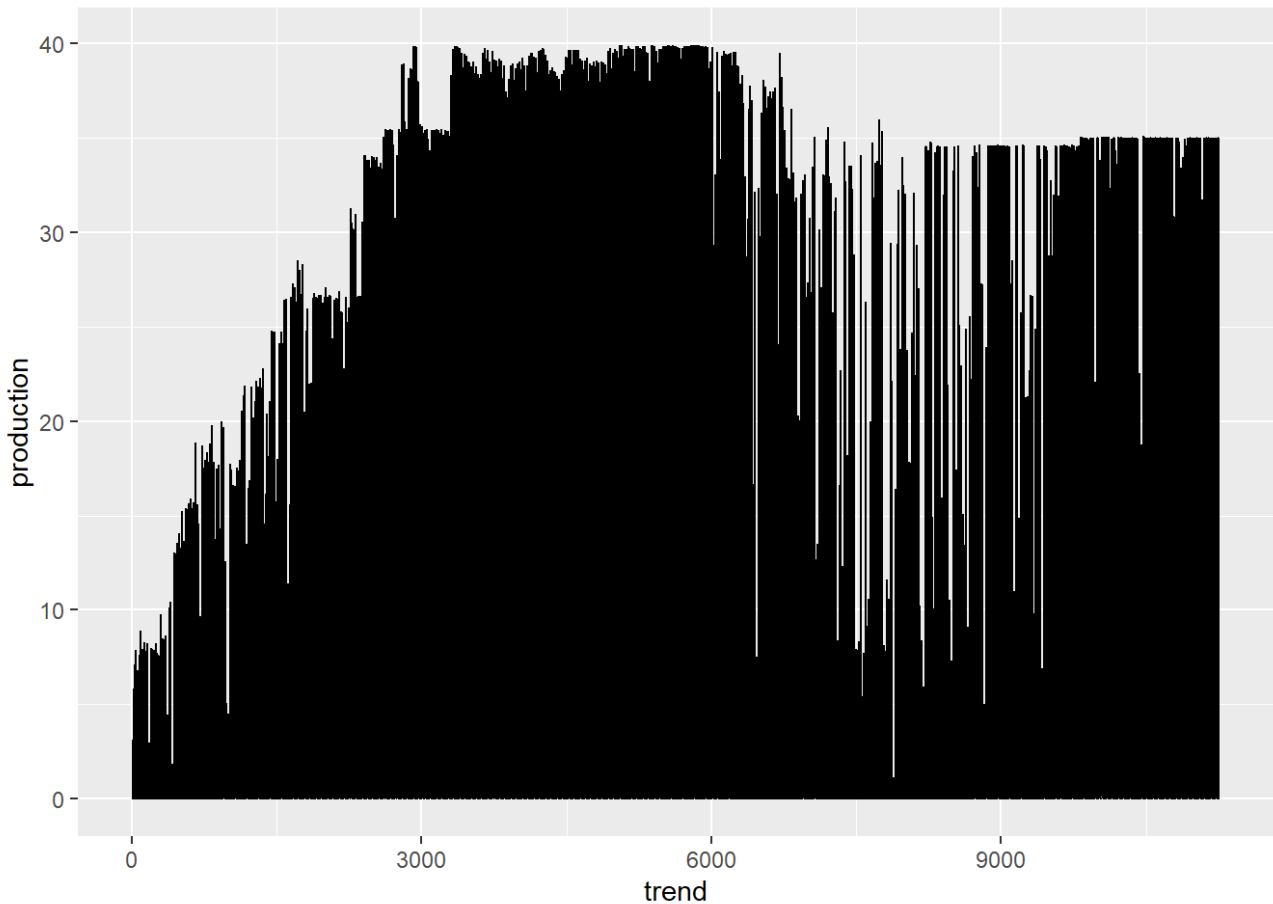
Code

</div>

```
## Classes 'data.table' and 'data.frame':    11256 obs. of  4 variables:
##  $ date      : Date, format: "2021-02-01" "2021-02-01" ...
##  $ hour      : int  0 1 2 3 4 5 6 7 8 9 ...
##  $ production: num  0 0 0 0 0 0 0 0 0.189 1.35 ...
##  $ trend     : int  1 2 3 4 5 6 7 8 9 10 ...
##  - attr(*, ".internal.selfref")=<externalptr>
```

<div style="text-align: right">

Code

</div>

2.4 The database which includes the NA production values

Code

Code

2.5 Finding The max function to find the max Production on last 30 days

Code

2.6 Creating 24 different data table for ease of implementation

Code

2.7 Copying the production value to Max Production column for first 30 Days

While we are looking for the max production we are searching for the max production in last 30 days but since the first 30 day doesn't have the history we prefered to copy the production value directly as max.

Code

2.8 Finding the Max Production in last 30 days

Since all different hours have different patterns we prefered to assign the max production value in last 30 days and same hour.

Code

2.9 Utilization

The utilization of each hour is calculated by the diving the production level to max production in last 30 days in same hour.

Code

2.10 Adding Utilization column to "data to be predicted" data to be able to rbind with the current data

As we merged production and weather csv files we prefered to erase the ones with NA value. However to be able to predict data we have to apply same column opperations to the "to be predicted" rows as well so we bind these data to the current table

Code

2.11 Lag 72 Max Production

since we wont be able to calculate last 30 days' max production for the last 72 data we prefered to copy the max Production of 3 days ago.

Code

2.12 Basic Linear Regression Model

Code

```
##
## Call:
## lm(formula = utilization ~ ., data = modified)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -116.80  -20.89   -6.91   13.91  108.21
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 1.982e+04  8.260e+03   2.400 0.016411 *
## date                       -1.062e+00  4.425e-01  -2.401 0.016370 *
## hour                       -7.704e-01  4.934e-02 -15.616  < 2e-16 ***
## CLOUD_LOW_LAYER_36.25_33   -2.098e-02  2.580e-02  -0.813 0.416217
## CLOUD_LOW_LAYER_36.25_33.25 -6.714e-02  3.534e-02  -1.900 0.057509 .
## CLOUD_LOW_LAYER_36.25_33.5  7.606e-02  2.912e-02   2.612 0.009013 **
## CLOUD_LOW_LAYER_36.5_33    -7.266e-02  2.564e-02  -2.834 0.004610 **
## CLOUD_LOW_LAYER_36.5_33.25 -2.825e-02  3.316e-02  -0.852 0.394314
## CLOUD_LOW_LAYER_36.5_33.5  -6.196e-02  3.171e-02  -1.954 0.050725 .
## CLOUD_LOW_LAYER_36.75_33   -2.953e-02  2.183e-02  -1.353 0.176141
## CLOUD_LOW_LAYER_36.75_33.25 -8.755e-03  3.532e-02  -0.248 0.804226
## CLOUD_LOW_LAYER_36.75_33.5  1.317e-01  2.840e-02   4.638 3.57e-06 ***
## DSWRF_36.25_33             -3.622e-02  1.319e-02  -2.746 0.006040 **
## DSWRF_36.25_33.25           1.492e-03  1.766e-02   0.084 0.932707
## DSWRF_36.25_33.5            2.300e-02  1.397e-02   1.647 0.099581 .
## DSWRF_36.5_33               1.880e-02  1.265e-02   1.486 0.137280
## DSWRF_36.5_33.25           -1.770e-02  1.598e-02  -1.108 0.267905
## DSWRF_36.5_33.5             4.764e-02  1.499e-02   3.178 0.001489 **
## DSWRF_36.75_33              2.995e-02  1.085e-02   2.761 0.005769 **
## DSWRF_36.75_33.25          -1.114e-02  1.649e-02  -0.676 0.499342
## DSWRF_36.75_33.5            4.326e-02  1.305e-02   3.315 0.000920 ***
## REL_HUMIDITY_36.25_33      -1.311e-01  7.857e-02  -1.668 0.095281 .
## REL_HUMIDITY_36.25_33.25   -1.024e-01  1.187e-01  -0.863 0.388333
## REL_HUMIDITY_36.25_33.5     4.677e-01  8.161e-02   5.731 1.02e-08 ***
## REL_HUMIDITY_36.5_33       -2.864e-01  7.547e-02  -3.794 0.000149 ***
## REL_HUMIDITY_36.5_33.25    -3.382e-01  1.140e-01  -2.966 0.003021 **
## REL_HUMIDITY_36.5_33.5     -4.185e-01  9.352e-02  -4.475 7.71e-06 ***
## REL_HUMIDITY_36.75_33       4.594e-01  6.960e-02   6.601 4.28e-11 ***
## REL_HUMIDITY_36.75_33.25   -3.493e-01  9.765e-02  -3.577 0.000348 ***
## REL_HUMIDITY_36.75_33.5     4.795e-01  6.510e-02   7.366 1.89e-13 ***
## TEMP_36.25_33               2.310e+00  6.050e-01   3.819 0.000135 ***
## TEMP_36.25_33.25            3.614e+00  8.649e-01   4.179 2.95e-05 ***
## TEMP_36.25_33.5            -8.459e-01  5.642e-01  -1.499 0.133814
## TEMP_36.5_33                1.319e+00  4.682e-01   2.817 0.004849 **
## TEMP_36.5_33.25            -4.747e+00  7.872e-01  -6.030 1.69e-09 ***
## TEMP_36.5_33.5              1.185e+00  5.057e-01   2.343 0.019167 *
## TEMP_36.75_33               3.988e+00  5.159e-01   7.730 1.17e-14 ***
## TEMP_36.75_33.25           -7.051e+00  6.734e-01 -10.470  < 2e-16 ***
```

```
## TEMP_36.75_33.5              3.920e-01  5.372e-01   0.730 0.465545
## trend                        4.461e-02  1.870e-02   2.386 0.017063 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 29.68 on 11216 degrees of freedom
##   (72 observations deleted due to missingness)
## Multiple R-squared:  0.5304, Adjusted R-squared:  0.5287
## F-statistic: 324.8 on 39 and 11216 DF,  p-value: < 2.2e-16
```

2.13 Taking Averages

Code

2.14 Adding weekday, month and trend as new columns

Code

2.15 Adding Lag Utilizations

We added lag 72 for utilization because clearly it has a high autocorrelation in a period of 24 due to hours as you can see from the below graph and we are not able to reach the lag24 since we are predicting 72 rows ahead.

2.16 ACF

Code

Series avgmerged$production

Also we prefered to add lag 73 since normally lag 1 is highly correlated and closes we can get is lag 73.
We also added weekly (168), monthly (720) lag as well as 15 day since we observed that within 15 day periods production is tend to increase once in a while.

Code

3 Model 1

The model 1 is the basic model. It only includes the hour and date.

Code

```
## 
## Call:
## lm(formula = production ~ hour + date, data = avgmerged)
## 
## Residuals:
##    Min     1Q Median     3Q    Max
## -12.81 -10.35  -8.89  12.04  30.02
## 
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -5.986e+01  1.850e+01  -3.235 0.001218 **
## hour         1.214e-01  1.943e-02   6.248 4.32e-10 ***
## date         3.652e-03  9.791e-04   3.731 0.000192 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 14.27 on 11253 degrees of freedom
##   (72 observations deleted due to missingness)
## Multiple R-squared:  0.004683,   Adjusted R-squared:  0.004506
## F-statistic: 26.47 on 2 and 11253 DF,  p-value: 3.382e-12
```

4 Model 2

Model 2 invvludes the average values hour and date.

Code

```
##
## Call:
## lm(formula = production ~ avgHUM + avgTEMP + avgCLOUD + avgDSWRF +
##     hour + date, data = avgmerged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -35.057  -6.253  -2.124   4.092  34.019
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.643e+02  1.469e+01 -17.988  < 2e-16 ***
## avgHUM      -7.252e-02  8.282e-03  -8.756  < 2e-16 ***
## avgTEMP      1.161e-01  1.523e-02   7.623 2.68e-14 ***
## avgCLOUD     2.206e-03  4.796e-03   0.460    0.646
## avgDSWRF     3.367e-02  4.208e-04  80.028  < 2e-16 ***
## hour        -4.357e-01  1.429e-02 -30.488  < 2e-16 ***
## date         1.282e-02  6.925e-04  18.519  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9.698 on 11249 degrees of freedom
##   (72 observations deleted due to missingness)
## Multiple R-squared:  0.5405, Adjusted R-squared:  0.5403
## F-statistic:  2206 on 6 and 11249 DF,  p-value: < 2.2e-16
```

5 Model 3

In model 3 we tried to observe if deleting one of the average values improve the model or not.

Code

```
##
## Call:
## lm(formula = production ~ avgHUM + avgTEMP + avgDSWRF + hour +
##     date, data = avgmerged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -35.044  -6.259  -2.118   4.087  33.991
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.653e+02  1.454e+01 -18.240  < 2e-16 ***
## avgHUM      -7.031e-02  6.751e-03 -10.415  < 2e-16 ***
## avgTEMP      1.166e-01  1.520e-02   7.669 1.87e-14 ***
## avgDSWRF     3.371e-02  4.123e-04  81.757  < 2e-16 ***
## hour        -4.352e-01  1.424e-02 -30.556  < 2e-16 ***
## date         1.286e-02  6.874e-04  18.714  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9.697 on 11250 degrees of freedom
##   (72 observations deleted due to missingness)
## Multiple R-squared:  0.5405, Adjusted R-squared:  0.5403
## F-statistic:  2647 on 5 and 11250 DF,  p-value: < 2.2e-16
```

6 Model 4

In model 4 instead of adding the averages we tried to add all the variables individually to see the effect.

Code

```
##
## Call:
## lm(formula = production ~ trend + TEMP_36.75_33.5 + TEMP_36.75_33.25 +
##     TEMP_36.75_33 + TEMP_36.5_33.25 + TEMP_36.5_33 + TEMP_36.25_33.25 +
##     TEMP_36.25_33 + REL_HUMIDITY_36.75_33.5 + REL_HUMIDITY_36.75_33.25 +
##     REL_HUMIDITY_36.75_33 + REL_HUMIDITY_36.5_33.5 + REL_HUMIDITY_36.25_
33.5 +
##     REL_HUMIDITY_36.25_33 + DSWRF_36.75_33.5 + DSWRF_36.75_33.5 +
##     DSWRF_36.5_33.5 + DSWRF_36.75_33 + DSWRF_36.5_33.5 + CLOUD_LOW_LAYER
_36.75_33.5 +
##     CLOUD_LOW_LAYER_36.25_33 + CLOUD_LOW_LAYER_36.25_33.5 + CLOUD_LOW_LA
YER_36.25_33.25 +
##     CLOUD_LOW_LAYER_36.5_33 + hour + date, data = merged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -40.134  -5.967  -1.298   4.187  34.401
##
## Coefficients:
##                             Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -7.700e+03  2.476e+03  -3.110 0.001877 **
## trend                      -1.674e-02  5.605e-03  -2.986 0.002833 **
## TEMP_36.75_33.5             6.747e-01  1.586e-01   4.254 2.12e-05 ***
## TEMP_36.75_33.25           -2.671e+00  1.813e-01 -14.737  < 2e-16 ***
## TEMP_36.75_33               1.307e+00  1.385e-01   9.437  < 2e-16 ***
## TEMP_36.5_33.25            -1.406e+00  1.780e-01  -7.899 3.07e-15 ***
## TEMP_36.5_33                3.178e-01  1.104e-01   2.879 0.004001 **
## TEMP_36.25_33.25            1.970e+00  1.481e-01  13.301  < 2e-16 ***
## TEMP_36.25_33               1.974e-01  1.533e-01   1.287 0.197970
## REL_HUMIDITY_36.75_33.5     1.046e-01  1.910e-02   5.476 4.43e-08 ***
## REL_HUMIDITY_36.75_33.25   -5.704e-02  2.542e-02  -2.243 0.024894 *
## REL_HUMIDITY_36.75_33       7.480e-02  1.651e-02   4.532 5.91e-06 ***
## REL_HUMIDITY_36.5_33.5     -1.767e-01  1.969e-02  -8.973  < 2e-16 ***
## REL_HUMIDITY_36.25_33.5     1.728e-01  1.429e-02  12.097  < 2e-16 ***
## REL_HUMIDITY_36.25_33      -1.256e-01  1.353e-02  -9.280  < 2e-16 ***
## DSWRF_36.75_33.5            9.088e-03  3.103e-03   2.928 0.003414 **
## DSWRF_36.5_33.5             1.611e-02  2.908e-03   5.540 3.09e-08 ***
## DSWRF_36.75_33              1.110e-02  1.962e-03   5.656 1.59e-08 ***
## CLOUD_LOW_LAYER_36.75_33.5  2.697e-02  5.747e-03   4.694 2.71e-06 ***
## CLOUD_LOW_LAYER_36.25_33    1.122e-02  6.941e-03   1.617 0.105911
## CLOUD_LOW_LAYER_36.25_33.5  2.779e-02  7.796e-03   3.564 0.000367 ***
## CLOUD_LOW_LAYER_36.25_33.25 -4.070e-02  9.664e-03  -4.211 2.56e-05 ***
## CLOUD_LOW_LAYER_36.5_33    -4.641e-02  5.180e-03  -8.960  < 2e-16 ***
## hour                       -2.816e-01  1.476e-02 -19.070  < 2e-16 ***
## date                        4.071e-01  1.326e-01   3.069 0.002150 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 8.939 on 11231 degrees of freedom
##   (72 observations deleted due to missingness)
## Multiple R-squared:  0.6103, Adjusted R-squared:  0.6094
## F-statistic: 732.7 on 24 and 11231 DF,  p-value: < 2.2e-16
```

7 Model 5

With model 5 we added the lag values for lag 1 week, the latest data we can get and one before. Which ended up with 80 percent R value.

Code

```
##
## Call:
## lm(formula = utilization ~ avgTEMP + avgHUM + avgDSWRF + lag168_u +
##       avgCLOUD + hour + lag72_u + lag73_u, data = avgmerged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -95.086  -7.596  -2.160   6.887 101.433
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) 169.002850   8.879100  19.034  < 2e-16 ***
## avgTEMP      -0.545748   0.029510 -18.494  < 2e-16 ***
## avgHUM       -0.128490   0.016513  -7.781 7.84e-15 ***
## avgDSWRF      0.026896   0.001074  25.048  < 2e-16 ***
## lag168_u      0.380851   0.008068  47.203  < 2e-16 ***
## avgCLOUD     -0.173963   0.009613 -18.097  < 2e-16 ***
## hour         -0.170264   0.029269  -5.817 6.15e-09 ***
## lag72_u       0.454328   0.010521  43.184  < 2e-16 ***
## lag73_u      -0.036915   0.009717  -3.799 0.000146 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 19.14 on 11079 degrees of freedom
##   (240 observations deleted due to missingness)
## Multiple R-squared:  0.8034, Adjusted R-squared:  0.8032
## F-statistic:  5658 on 8 and 11079 DF,  p-value: < 2.2e-16
```

8 Model 6

We observe the effect of deleting the 1 week lag data.

Code

```
##
## Call:
## lm(formula = utilization ~ avgTEMP + avgHUM + avgDSWRF + avgCLOUD +
##     hour + lag72_u + lag73_u, data = avgmerged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -95.616  -9.358  -2.923   7.220  99.383
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) 155.982153   9.682531  16.110  < 2e-16 ***
## avgTEMP      -0.492317   0.032177 -15.300  < 2e-16 ***
## avgHUM       -0.122271   0.017957  -6.809 1.03e-11 ***
## avgDSWRF      0.037089   0.001146  32.364  < 2e-16 ***
## avgCLOUD     -0.166869   0.010445 -15.975  < 2e-16 ***
## hour         -0.269134   0.031747  -8.477  < 2e-16 ***
## lag72_u       0.737292   0.009428  78.203  < 2e-16 ***
## lag73_u      -0.041626   0.010536  -3.951 7.83e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 20.91 on 11175 degrees of freedom
##   (145 observations deleted due to missingness)
## Multiple R-squared:  0.7659, Adjusted R-squared:  0.7658
## F-statistic:  5223 on 7 and 11175 DF,  p-value: < 2.2e-16
```

Model 5 happens to be the best model among the above 5. So we decided to predict with this model at first.

9 Interpretation of the models

9.1 We tried to observe what we get

Code

```
##     [1]      NA        NA        NA        NA
NA
##     [6]      NA        NA        NA        NA
NA
##    [11]      NA        NA        NA        NA
NA
##    [16]      NA        NA        NA        NA
NA
##    [21]      NA        NA        NA        NA
NA
##    [26]      NA        NA        NA        NA
NA
##    [31]      NA        NA        NA        NA
NA
##    [36]      NA        NA        NA        NA
NA
##    [41]      NA        NA        NA        NA
NA
##    [46]      NA        NA        NA        NA
NA
##    [51]      NA        NA        NA        NA
NA
##    [56]      NA        NA        NA        NA
NA
##    [61]      NA        NA        NA        NA
NA
##    [66]      NA        NA        NA        NA
NA
##    [71]      NA        NA        NA        NA
NA
##    [76]      NA        NA        NA        NA
NA
##    [81]      NA        NA        NA        NA
NA
##    [86]      NA        NA        NA        NA
NA
##    [91]      NA        NA        NA        NA
NA
##    [96]      NA        NA        NA        NA
NA
##   [101]      NA        NA        NA        NA
NA
##   [106]      NA        NA        NA        NA
NA
##   [111]      NA        NA        NA        NA
NA
##   [116]      NA        NA        NA        NA
NA
```

```
##   [121]            NA            NA            NA            NA
NA
##   [126]            NA            NA            NA            NA
NA
##   [131]            NA            NA            NA            NA
NA
##   [136]            NA            NA            NA            NA
NA
##   [141]            NA            NA            NA            NA
NA
##   [146]            NA            NA            NA            NA
NA
##   [151]            NA            NA            NA            NA
NA
##   [156]            NA            NA            NA            NA
NA
##   [161]            NA            NA            NA            NA
NA
##   [166]            NA            NA            NA   -1.102407695   -0.6161
88631
##   [171]   0.100803229   0.753526783   3.446531064   3.153698335    3.0744
26250
##   [176]   3.183698448  86.824477973  83.141035616  88.171241895   89.7876
69105
##   [181]  90.831719908  91.110069319  90.772448478  90.247121943   88.1270
45450
##   [186]  85.989961870   0.999488633   3.902648743   3.040407660    3.1861
80041
##   [191]   1.832959477   1.936237667   6.032749673   6.229556132    6.4134
97696
##   [196]   6.508020732   6.154316269   6.227795180   6.393332783    6.3081
78471
##   [201]  89.607329371  85.381209562  92.678235634  94.513134173   95.9754
80378
##   [206]  96.979186981  97.522970447  97.501883544  95.243112929   92.6569
66551
##   [211]   6.306296185   8.120588590   7.139959877   6.548700571    2.9734
00598
##   [216]   3.097795853   7.205058508   7.150083240   6.931098028    6.7070
05199
##   [221]   6.880503789   6.585445856   6.184379266   5.789804365   88.8929
62763
##   [226]  84.440661180  91.589340075  92.039007217  92.465687352   93.1966
47034
##   [231]  93.895565332  94.341732728  92.862408337  90.831949465    4.8729
95801
##   [236]   7.674162250   6.923142626   6.583325861   3.430913899    3.5628
79484
```

```
##   [241]    7.636318626     7.680242481     7.485858398     7.348797680     7.3993
82285
##   [246]    7.242026900     7.022728716     6.834214568    89.916237747    85.2992
59211
##   [251]   92.590715018    94.401111690    95.808335352    96.659592762    96.6489
35321
##   [256]   95.855068399    88.902656166    86.064632409    -0.285670115     1.1519
04806
##   [261]   -0.125908093    -0.884396025    -3.330340977    -3.460552308     1.3810
05203
##   [266]    1.408720092     1.099501796     0.550683179    -5.182435982    -2.8033
17411
##   [271]   -1.629605101    -1.066902579    82.950912938    79.569789119    86.5905
38021
##   [276]   89.622536361    92.618286763    94.701182874    95.595087302    95.5703
41354
##   [281]   90.765188236    89.363837075     3.739926169     6.055963937     5.3664
05002
##   [286]    5.141858270     3.250543251     3.709877348     7.972454029     7.9920
93642
##   [291]    7.845843798     7.710054534     7.672753895     7.729548510     7.7885
21646
##   [296]    7.695029378    90.965581469    87.263183387    94.963922438    96.8702
32346
##   [301]   98.096549554    98.748471610    98.722083375    98.400377970    95.5227
37945
##   [306]   92.664857393     5.483479725     6.396475645     4.738949509     3.8249
68796
##   [311]    1.419049803     0.801520897     4.686499048     4.703584294     4.6984
77478
##   [316]    4.785157451     4.693533533     4.752451330     4.807196797     4.9495
93048
##   [321]   88.216725336    84.446693275    91.926977629    93.271031922    93.3785
37610
##   [326]   93.159041862    92.530055077    91.258727647    86.387618378    83.8698
35722
##   [331]   -1.903866121     0.116744936    -0.768456961    -0.936716092    -2.8062
54252
##   [336]   -1.345770875     3.605970691     3.998347113     4.145491914     4.1869
66755
##   [341]    5.712320323     5.153752021     4.308272666     3.578631560    86.1951
26293
##   [346]   82.570966603    91.487871637    91.858017081    90.686500394    88.1560
30109
##   [351]   85.932972659    83.315723425    75.869821931    73.209070472   -13.4396
15149
##   [356]  -11.907804314   -13.100827336   -13.906159972   -17.352854282   -17.2871
80161
```

```
##   [361] -13.244732955 -12.756280890 -11.874696221 -11.013822015  -8.1670
31159
##   [366]  -8.808516461  -7.204190300  -5.837416972  79.018854467  76.2672
69906
##   [371]  71.102532225  73.189937731  76.761609890  79.681384233  83.0015
92411
##   [376]  85.186212601  92.079409444  87.060467727  -1.207972211   0.7317
78080
##   [381]   0.235320322  -0.119647040   1.019352150   2.917148272   7.6124
72198
##   [386]   7.096641284   5.980061110   5.372112286  -2.438121783  -2.9581
73935
##   [391]  -2.190879388  -1.585663277  82.259232083  79.728077640  94.9025
32674
##   [396]  97.725814671  99.222615431 100.494844108 101.029871336 101.0482
08126
##   [401] 100.166411782  98.040861927  12.262679033  13.969451710  12.8404
62246
##   [406]  11.915626970   7.689168882   7.167869031  11.426663472  11.9083
77380
##   [411]  12.481501386  12.925869426  14.761792302  14.706052761  14.5536
47673
##   [416]  14.431703586  97.830952411  94.726619549 103.404176062 105.3449
26493
##   [421] 106.721540436 107.426517849 107.647995067 107.447824571 105.2353
03697
##   [426] 102.544519818  15.736162432  17.520800223  16.606257905  15.7996
76692
##   [431]  11.268331312  11.247556525  13.967312286  12.120662386   9.6224
27630
##   [436]   8.043385850   6.744012284   7.286529381   6.744997716   6.0748
47879
##   [441]  89.068297889  85.158050628  97.490886823  99.729772723 101.4667
89692
##   [446] 102.338961537 102.649222796 102.565303428 100.983174500  98.8008
29028
##   [451]  12.722493690  14.318609648  12.875994031  12.097816330   8.0799
40797
##   [456]   7.998767418  13.626178666  13.599903086  13.580673325  13.5448
12647
##   [461]  13.291327958  13.223624723  13.193173460  13.172287453  96.4784
26052
##   [466]  93.168010726  99.935818733 101.855312379 103.140480770 103.9717
73085
##   [471] 104.329581781 104.155508125 101.850599175  99.447873777  13.1407
71208
##   [476]  15.280079558  14.403969688  13.646312994   9.542525448   9.5918
69337
```

```
##   [481]  13.686899752  13.694936146  13.628107281  13.600911503  13.4932
06601
##   [486]  13.529813022  13.517888403  13.554658577  96.836572456  93.4447
24066
##   [491] 101.956099605 103.677215624 104.868531328 105.716179655 105.9786
10126
##   [496] 105.818740342 103.171122557 100.617833042  14.213619745  16.3291
16247
##   [501]  14.950930467  13.958789856   8.963250313   8.893780173  12.9096
30763
##   [506]  12.894022275  12.896342430  12.866867812  12.989633930  13.0203
79917
##   [511]  13.006246878  12.968785004  96.096637031  92.389777111 100.6782
92765
##   [516] 102.185168410 103.386331277 104.137201208 104.397235918 104.2747
15254
##   [521] 101.805999463  99.306888766  13.096772293  14.995834152  13.5231
02538
##   [526]  12.458609583   7.298536362   7.131733924  11.023496600  10.8103
66235
##   [531]  10.609918848  10.411966030  10.236834582  10.120346856  10.0190
52883
##   [536]   9.913108738  93.133900532  89.519928690  97.942061298  99.6315
58759
##   [541] 101.137572185 102.029743239 102.489029843 102.532295540 100.0795
27093
##   [546]  97.618266878  11.292463600  12.822875660  11.219708634  10.1476
25908
##   [551]   5.526339708   5.388216276   9.340567859   9.168267703   8.9231
50308
##   [556]   8.583432708   8.619028948   8.437079140   8.212469345   7.9839
69458
##   [561]  91.190220275  87.951181928  96.670845178  98.608489497 100.1591
20604
##   [566] 100.909959641 101.419534377 101.578444960 100.007021375  97.6619
75326
##   [571]  11.577960091  13.024705693  11.294660820  10.012455827   5.2309
06530
##   [576]   5.067934385   9.072595884   8.973785578   8.841632120   8.6916
40843
##   [581]   7.703836414   7.681230453   7.694117655   7.709561465  91.0964
64879
##   [586]  88.090560680  98.026726678 100.114439710 101.794797804 102.7977
85012
##   [591] 103.231995557 103.237172905 100.897802705  98.462547023  12.0570
23879
##   [596]  13.752465722  12.321332861  11.258053034   5.967355376   5.9011
46030
```

```
##    [601]    9.928158322    9.875473351    9.839093750    9.786995885    9.6061
38974
##    [606]    9.541226234    9.505383718    9.454068846   92.549827661   89.2747
49741
##    [611]   98.439030282  100.281828281  101.764692440  102.612125864  102.9844
83308
##    [616]  102.893480492  100.427301975   97.822116958   11.205770387   12.7481
20529
##    [621]   11.305645175   10.460010298    5.181740602    5.376209546    9.6321
55376
##    [626]    9.674551528    9.725416693    9.768796757    9.739470242    9.7415
19338
##    [631]    9.774256899    9.847053974   92.591362634   89.240583966   98.6769
52076
##    [636]  100.504533797  101.856497602  102.717467084  103.011264667  102.8254
52332
##    [641]  100.251820449   97.671920238   10.999546008   12.126742952   10.6142
11316
##    [646]    9.290707723    1.979747918    0.955339832    4.533661085    4.1727
60811
##    [651]    4.729774269    5.558872211    6.929306036    6.609229812    6.2886
81332
##    [656]    5.972224425   89.049998198   85.969122119   94.537808684   96.1073
68202
##    [661]   97.820341107   98.558600061   99.084542193   99.778141054  101.6777
43625
##    [666]   99.386341265   13.412461107   15.175238976   13.759842377   12.6879
99886
##    [671]    7.876779539    7.798346893   11.808726310   11.690059223   11.5319
59129
##    [676]   11.322862215   11.101264788   10.937458234   10.782437858   10.6982
04861
##    [681]   93.998760610   90.952863502   97.866617941   96.401378681   96.1507
76789
##    [686]   96.975892067   98.219656897   98.008092500   84.347447153   82.6310
11116
##    [691]   -4.687599879   -4.333372835   -6.485865493   -7.889666790  -14.0955
86655
##    [696]  -14.453715493  -10.530104961  -10.615156159  -10.512708474  -10.4675
58169
##    [701]  -10.848381774  -10.850693918  -10.661277562  -10.229951307   73.8933
46907
##    [706]   71.014155938   73.979207320   74.884933884   75.068046228   76.6395
99299
##    [711]   78.226953928   79.115735569   86.979992728   84.576516384   -0.1221
70331
##    [716]    1.752529698    0.842160471    0.001302165   -8.657687961   -7.7593
30131
```

```
##   [721]  -1.289181841    1.486542549    2.738666539    3.187178710    3.6554
43157
##   [726]   4.458512523    6.240751223    6.998446664   90.816946417   87.8405
09512
##   [731]  99.290994179  101.369155484  103.193744702  104.422341171  105.1144
77070
##   [736] 105.343291107  103.292513113  100.845367279   14.356632361   16.0580
11747
##   [741]  14.425742790   13.266817115    7.719470036    7.743731040   11.8008
88008
##   [746]  11.793964819   11.810056373   11.830907364   11.789173676   11.8647
07874
##   [751]  12.005122074   12.156987199   95.099770264   91.092365252  101.4737
25966
##   [756] 103.506171378  104.924893866  105.247294899  105.405520785  104.8233
68438
##   [761] 101.063795919   98.022353872   10.918439121   12.031846805    9.9491
43161
##   [766]   8.643175821    2.501589129    2.319297567    6.375647507    6.5733
37843
##   [771]   6.764257888    6.861690461    7.680202652    7.519707200    7.4880
74465
##   [776]   7.000732808   89.264914582   85.206993191   92.618829049   94.8128
08119
##   [781]  97.293558855   98.316149033   98.555774328   97.668664034   89.8714
53761
##   [786]  87.732628642    1.745997729    3.954936822    3.124808927    2.7232
09595
##   [791]   2.036356835    2.265246731    6.508865309    6.758529116    6.9491
18303
##   [796]   7.068884901    8.353824558    8.659061316    9.106907043    9.1577
56280
##   [801]  91.789158615   88.561915230   97.856774926   89.196485428  101.8563
58292
##   [806]  99.090724001   91.804896260  101.923433392   98.597875071   96.6999
15580
##   [811]  10.143435825   11.134437951    9.125331381    7.319425850    0.9429
09151
##   [816]   0.486846702    4.205492484    4.030009789    4.285722624    4.3027
32693
##   [821]   3.213839780    2.998700821    3.640648292    4.347883746   88.2747
02619
##   [826]  85.817571816   97.914782772  100.283138241   99.775575124  102.8595
85106
##   [831] 102.415830631  102.463954034   97.030072960   95.069431761    9.2332
00501
##   [836]  10.381045240    8.779579290    7.974384069    3.084149392    3.1706
80979
```

```
##   [841]    7.317302587    7.130090632    7.016263178    6.960018412    7.7195
63562
##   [846]    7.860612091    7.951148347    7.961472804   68.223111919   86.8915
52822
##   [851]   97.438491364   93.529262819   99.337754645  100.053945664   99.9516
11303
##   [856]   98.265811073   64.327908468   52.669673496    0.136056720   -0.3257
29474
##   [861]   -1.782734145   -1.671977676    1.468547179    1.509155451    5.6611
87586
##   [866]    5.721603475    5.701155910    5.635840493    5.689449208    5.6121
31252
##   [871]    5.556088523    5.467670903   81.466965681   85.556998477   96.0495
39192
##   [876]   97.873327789   96.812655163  100.281889230   99.472734342  101.1384
15753
##   [881]   91.634486011   79.438479799   11.698695134   11.388396946    9.6351
85621
##   [886]    8.530164055    3.163174995    3.331245445    7.385628123    7.3358
72810
##   [891]    7.299636280    7.229675721    7.214195216    7.211865191    7.2041
12619
##   [896]    6.903104554   83.850037569   87.054993878   96.273553366   86.4728
29061
##   [901]  100.048482424   92.899012570   91.668831607   98.079547996   94.2407
28981
##   [906]   80.324396785   55.038143585    3.922873438    5.217081782    3.6130
40571
##   [911]   -2.003467255   -4.396587722   -0.639738700    0.303797488    2.2832
73687
##   [916]    3.171137688    8.839889820    9.138553564    9.332341778   55.1156
88512
##   [921]   74.390648936   87.905391521  101.779292734   91.185286277   89.9008
23400
##   [926]   80.502712907   81.377856747   73.724698570   70.563401422   70.3228
06145
##   [931]   49.530668328   15.227679921   16.019935215   14.871361729    8.7512
63758
##   [936]    8.737967084   12.818553764   12.828310117   12.795675863   12.6881
77746
##   [941]   12.776216081   12.696850944   12.615853874   49.199125472   48.9567
83064
##   [946]   81.548910261  100.897867251   96.287101105   98.130930789   99.3055
42792
##   [951]  103.307557023   99.115430947   77.339322584   62.430965076   57.7524
21688
##   [956]    8.557476525   10.021091626    8.609738156    2.467300906    2.2562
22191
```

```
##    [961]    6.236505837    6.156696665    6.042511806    5.960492818    5.8083
91480
##    [966]    5.713281811    5.599148929   51.021575270   67.763616105   85.9366
89696
##    [971]   95.701602593   95.619508916   89.258457691   90.912954428   92.6121
48298
##    [976]   79.134549356   72.039672170   62.162395123    9.488907012   -6.9197
19719
##    [981]   -5.574445916   -5.780555943   -3.711123858   -7.358992083   -4.5983
37626
##    [986]   -5.934391416   -7.016698776   -7.251794870  -10.529025231  -11.8183
82565
##    [991]  -12.619845003    6.564331541   43.279854391   51.970218149   48.8791
55572
##    [996]   47.874941083   49.825038661   66.861901833   67.528052260   64.2063
89154
##   [1001]   63.274309768   44.425199676   66.651559784  -18.467140618  -15.3465
19084
##   [1006]  -15.773247882  -16.801284346  -17.192255828  -13.310210980  -13.4670
59734
##   [1011]  -13.572395825  -13.519489932  -14.363615127  -14.072275559  -13.8895
78656
##   [1016]   69.551753407   47.969167615   66.029580825   95.872838586   87.9296
95464
##   [1021]   89.342173673   72.551963555   81.365582485   69.680847713   68.0008
81691
##   [1026]   66.874114767   68.745729727   12.137575987   11.954919024   10.3112
78812
##   [1031]    3.460533211    3.347799766    7.033457840    6.216412135    5.4209
30027
##   [1036]    5.081219420    3.707054031    1.860749206   -2.027581218   44.6205
94976
##   [1041]   32.014447367   52.104622820   49.074629411   49.941397587   41.2966
50412
##   [1046]   31.474612497   34.874587829   34.604327237   54.567292424   53.1185
25850
##   [1051]   59.098506637   12.029539808   10.579151910    9.295010254    4.2164
97627
##   [1056]    4.090848711    7.730866580    7.451798546    7.243018796    6.7920
44663
##   [1061]    7.577435770    7.593851756    7.583714718   53.080838761   37.7207
16702
##   [1066]   47.280994987   57.203009408   56.445856419   56.303919179   53.1536
78055
##   [1071]   56.266530956   42.869947985   58.804285777   64.941756240   68.3842
51443
##   [1076]    9.997989993   11.411582759   10.243397342    4.927485528    4.6283
53934
```

```
##   [1081]    8.595061515    8.603661810    8.691691195    8.790008195    9.2070
89987
##   [1086]    9.153763420    9.095983685   38.532527073   66.227095855   75.2848
78915
##   [1091]   77.875643897   73.637069783   80.161735445  100.138511602  100.1821
11428
##   [1096]   98.601829991   87.392216302   86.628001436   90.055338511    5.7655
42042
##   [1101]    7.722638501    6.841270946    3.070053833    3.066588998    7.1167
97111
##   [1106]    7.232357009    7.412087131    7.512734114    7.804960665    7.6662
87571
##   [1111]    7.708680649   64.363445947   46.097855705   52.444524337   78.3282
52876
##   [1116]   56.818725375   58.661484919   51.397373752   84.252896619   72.2786
32534
##   [1121]   80.712951077   81.483892874   67.230340179   -3.184044232   -0.7162
60847
##   [1126]   -1.211329649    0.963071198    0.965405880    5.136437471    5.1455
14779
##   [1131]    5.147069264    5.219357758    5.186626811    5.321062097    5.4521
20899
##   [1136]   40.795279372   56.797493383   70.915137881   60.105835073   76.9724
19022
##   [1141]   76.851190456   57.948631132   66.987024914   58.099770287   41.1458
18215
##   [1146]   33.025158910   35.266765610   10.429362743    9.864493444    8.7838
43121
##   [1151]    2.649263843    2.906802290    7.257511240    7.419629606    7.3634
84324
##   [1156]    7.297312421    7.363959847    4.601160854    1.168959901   29.4864
36045
##   [1161]   46.883779667   45.933962938   59.249647887   65.470211658   64.0235
32099
##   [1166]   55.697598914   55.995190089   52.426572206   64.788200407   66.2439
41564
##   [1171]   87.997950891    7.943747154    9.636818627    8.440730208    1.9456
47333
##   [1176]    2.013068806    5.948194265    5.973085968    5.924485864    5.7269
09737
##   [1181]    4.240547881   -2.408856744   -1.607083296   33.722580397   40.2885
70911
##   [1186]   60.974890566   49.278003739   51.375151488   54.006427705   55.6117
29972
##   [1191]   54.857225428   42.548273166   46.871551220   61.475711250   63.8086
01294
##   [1196]  -17.664812889  -13.949844574  -12.416365109   -5.669441311   -6.4339
63319
```

```
##  [1201]   -1.165588669   -1.046548072   -0.980156224   -0.717701243    1.5182
45032
##  [1206]   -0.584915178   -2.446523903   49.256486541   39.981697557   42.5511
63171
##  [1211]   55.604863576   43.458423510   47.352865816   51.085871293   76.3913
38499
##  [1216]   72.234454901   78.390741700   79.775175324   81.700395978   -0.9002
72490
##  [1221]    2.968280117    3.192597432    0.749214942    0.121759218    1.5583
49869
##  [1226]    0.877240966    0.953387878    1.388682452    4.270624724    6.7932
58504
##  [1231]    7.873587818   41.141376082   53.264847642   80.862129554   84.4272
39450
##  [1236]   96.099145378  101.484478326   94.051584483  101.556359832   94.3007
02295
##  [1241]   71.386305500   58.086185565   57.771061360    6.180958657    8.0424
17512
##  [1246]    7.878689339    7.589472513    7.136372233   10.105785310    8.3611
10316
##  [1251]    6.861212884    5.318633803   -2.454419329   -2.139677592   -2.1154
94484
##  [1256]   16.629675490   34.007211981   39.400511702   52.923227828   64.0183
40614
##  [1261]   62.899046922   54.901363848   55.483867107   62.389996653   95.1649
04016
##  [1266]   96.707134825   78.693191483   15.331561951   15.229050093   13.9156
56134
##  [1271]    8.518810086    8.352311594   12.284613523   12.093633142   11.8999
61383
##  [1276]   11.657021735   11.020385986   10.779043925   10.531761152   40.4479
12312
##  [1281]   29.360060985   45.550072288   63.141316253   90.596755175   91.4747
18815
##  [1286]   87.300844264   85.470951250   83.840521614   61.869376343   84.8204
06145
##  [1291]   83.781040410   14.405995087   14.756767251   13.358950106    6.9070
42130
##  [1296]    6.729735790   10.672261928   10.500107219   10.332051544   10.1630
32078
##  [1301]   10.168299072   10.076293710    9.977001091   73.209089594   83.5012
69958
##  [1306]   84.472086021   94.525290802  106.226935909  106.224915127   87.1053
52281
##  [1311]   89.869981264   93.734968410  103.747253145   99.297170292   99.1592
83014
##  [1316]   12.473519296   14.302214827   13.096598165    6.344498717    6.1967
28709
```

```
##  [1321]   10.137672960   10.021300640    9.949145353    9.867794230    9.7603
75388
##  [1326]    9.651730473    9.562820756   38.420589386   41.445259075   73.9619
21681
##  [1331]  103.929445722   95.770696415  103.166012810   97.025651010   96.7515
24041
##  [1336]  100.180208684   70.358296631   83.438820204   88.421222010   11.9749
12644
##  [1341]   13.712122800   12.628228597    5.877860582    5.877551475    9.9975
30082
##  [1346]    9.989476220    9.953057441    9.920462893    9.764898780    9.6562
10523
##  [1351]    9.568064796   56.013755467   51.315983576   45.908822417   68.8288
56937
##  [1356]   70.828785515   75.982730621   73.282861287   73.778183306   73.2992
18056
##  [1361]   87.316587316   86.076134466   69.910328832    2.383685292    4.6157
21982
##  [1366]    4.090962459    3.489777311    3.610332474    7.711688667    7.5995
78490
##  [1371]    7.459768499    7.023410727    0.251842369    1.061090594   -0.9722
24107
##  [1376]   30.457061875   42.221016459   38.837110924   45.005543944   61.6035
47993
##  [1381]   73.764352298   68.868756652   72.000102609   80.990312303   66.4521
90897
##  [1386]   77.507094270   77.730021929    5.386760615    7.298041271    5.4164
02409
##  [1391]   -5.807024356   -6.527595741   -3.086134631   -3.226788935   -3.0745
41896
##  [1396]   -2.646197330   -2.202643137   -1.387758714   -1.433068430   62.7389
10706
##  [1401]   76.725087720   75.666045988   88.994174211   99.219752763  102.0174
43416
##  [1406]   86.408170463   82.536831700   91.982350649   91.627970723   88.7330
06116
##  [1411]   83.156761512   -2.938066335   -2.076641671   -4.379879574  -13.9956
41302
##  [1416]  -14.270779210  -10.090777018  -10.116269272  -10.152607836   -9.8847
98734
##  [1421]   -9.763107103  -10.220271672  -10.533474343   47.439474330   44.5005
37455
##  [1426]   55.735324643   74.259496128   67.025230841   75.184236200   70.9924
62524
##  [1431]   69.620008388   75.319384847   53.287416446   60.490684176   73.5036
92736
##  [1436]   -1.071170504    1.596346034    1.789778777    2.813387259    2.8665
13383
```

```
##  [1441]   7.055103084    7.074023581    7.067181342    7.060441770    7.3218
70452
##  [1446]   7.352517790   52.764826499   83.590875183   72.994219412   57.8424
57271
##  [1451]  88.162387143   85.105622225   85.405112288   85.116619065   88.7218
88856
##  [1456]  90.001632217   75.902998373   70.728822761   56.250730677   50.9916
04898
##  [1461]   0.827414411    3.141288110   -2.214938023   -2.081264290    2.2467
63849
##  [1466]   2.689337379    2.769914784    3.007599013    2.722809637    3.1702
55562
##  [1471]  48.874833913   65.535781511   84.423249966   83.861127999   86.5959
38991
##  [1476]  79.045758052   88.411428079   70.735878734   83.273605771   78.9883
39682
##  [1481]  63.934916034   57.730077518   64.612430081    2.344600640    2.7761
04646
##  [1486]   2.345277803   -0.070054579   -0.395118239    3.906157697    3.9667
55998
##  [1491]   3.988183296    4.004083313    4.304155811    3.956938887    3.7281
65750
##  [1496]  39.238375308   48.832599435   47.934682716   62.469896040   73.1673
89393
##  [1501]  94.583268431   98.231111008   81.390432458   86.858708874   98.1311
49909
##  [1506]  81.218638813   61.625606078   10.274323855    9.431542282    8.2991
24418
##  [1511]   2.222228038    2.389141605    6.819784591    7.180018646    7.4933
04694
##  [1516]   7.702597416    7.929604168    7.978765863   53.362754568   87.0406
57167
##  [1521]  83.232411344   83.120132628   96.156358261   97.062758259   99.8839
46587
##  [1526] 100.774973408   93.150465207   89.955179070   79.267945246   66.0409
30867
##  [1531]  90.768730282    9.656104223   11.865940857   10.721743286    3.9746
02888
##  [1536]   4.077861802    8.163819893    8.094964801    7.888913507    7.6156
17304
##  [1541]   7.248108200    7.044494188   72.742257579   84.730986606   73.1274
87908
##  [1546]  67.076296267   86.995786294   86.814479598   82.490445575   68.7614
71306
##  [1551]  80.120466990   91.875303244   61.775775578   61.475256523   50.7203
25092
##  [1556]  49.289811332   11.465096668   10.184514726    3.080307143    3.4455
94042
```

```
##  [1561]    7.899995642    8.194669255    8.339149875    8.444792699    8.3974
82769
##  [1566]    8.455281416   54.331076089   48.669755246   50.930372902   55.9427
93106
##  [1571]   70.768119211   71.135105332   74.291700315   63.282007369   71.7538
34164
##  [1576]   77.631715247   71.234710895   67.802903929   75.142030698    8.7196
68058
##  [1581]   10.220672792    8.839862489    2.354052818    2.325670530    6.3068
22397
##  [1586]    6.131674737    5.880719264    5.677854099    4.973929564    5.0695
43677
##  [1591]    8.905911178   13.064857479   17.754912814   23.907258095   36.0606
46209
##  [1596]   64.901529106   80.796613591   84.887278359   72.554631628   71.7282
50513
##  [1601]   81.288746907   62.216054852   55.841914724   -1.308568328    2.7679
34393
##  [1606]    0.986788488   -0.445320070   -0.611101855    2.840862769    1.7562
48060
##  [1611]   -0.789040913   -2.364733018   -9.928698001   -8.580388718   75.6788
59322
##  [1616]   67.029425948   68.131812707   74.344038699   79.637841871   80.2769
75061
##  [1621]   83.604651417   85.328981521   82.054690806   78.332529081   77.1527
19125
##  [1626]   70.414495346   88.942792880   23.316677184    5.068023681    5.6033
38762
##  [1631]    0.995759755    0.662780850    4.710400238    4.409351560    4.3536
63531
##  [1636]    4.426410117    6.554548722    7.557351140   76.747473808   88.1590
11650
##  [1641]   85.853143766   78.543131554   99.006142541   94.098755163  101.7390
15227
##  [1646]   88.207456208   96.442033945  100.963013556   77.050620419   77.0819
99492
##  [1651]   72.764695291   26.164800839    7.819479266    8.718604936    6.2242
86120
##  [1656]    5.588229186    9.182901202    8.567883834    8.242176541    7.9395
89609
##  [1661]    7.444326542    7.491876980   29.473726517   53.869384321   49.5341
71859
##  [1666]   51.617399019   67.519960039   72.446148413   65.352752355   71.8750
31909
##  [1671]   76.852403224   83.606697671   71.881827464   57.736682256   60.8465
22502
##  [1676]   21.117247619   10.471642386   10.416125037    6.275095227    6.1972
17492
```

```
##  [1681]  10.189823413  10.058716267   9.923200074   9.782930621   7.6198
02700
##  [1686]   6.243621765   8.740719145  11.021144715  13.485084563  22.7055
49923
##  [1691]  47.984866769  71.278827332  75.569493764  79.875132234  81.6874
64118
##  [1696]  73.737622530  64.560425464  67.801572019  60.082829047  11.2144
84590
##  [1701]   9.737069780   8.339245565   3.429517127   3.471370601   7.5469
43243
##  [1706]   7.467711229   7.416682559   7.386240012   7.568902245   7.3946
19852
##  [1711]  88.626567326  78.880069504  59.938189556  64.715954665  82.7767
70203
##  [1716]  90.225062009  93.541930571 102.704890895 101.615439869  96.0049
95293
##  [1721]  93.948613089  72.496318377  66.649688063  48.437189806   1.7101
87498
##  [1726]   3.311076590   0.385579170   0.463639232   4.754728376   4.8517
52968
##  [1731]   4.845825426   4.827713343   5.088643749   5.361826762  51.4819
27315
##  [1736]  53.172685097  50.998718338  73.678009286  96.348523276  92.4813
01719
##  [1741] 102.336646623 101.523177977 102.322599791 103.991230936 100.3514
38269
##  [1746]  98.584136761  92.477229153  70.335140073   6.677926710   8.8561
38088
##  [1751]   1.510356009   1.634644799   5.782817026   5.781426764   5.7311
36322
##  [1756]   5.678689158   5.729599595   5.666815356  40.436693250  76.6616
56873
##  [1761]  85.881668060  82.662689220  92.677028886  92.688495598  85.2656
94360
##  [1766]  85.267969346  91.837029279  92.813895109  82.590499246  67.0052
50255
##  [1771]  56.545851614  28.977009061   9.874474159   9.364475749   1.9433
29399
##  [1776]   2.009337459   6.155515037   6.199314262   6.134922958   6.0552
54066
##  [1781]   5.976552602   5.893824953  51.165658421  41.753883824  50.5237
43617
##  [1786]  45.520323388  62.930896129  66.032689041  65.487820177  73.2144
25010
##  [1791]  71.033695696  62.245673490  60.301931321  61.895868726  48.0720
78004
##  [1796]  28.237977221   5.360621844   6.228591676   0.579443245   0.6807
19247
```

```
##  [1801]    4.906315298    4.921601504    4.948429452    4.960950593    4.9210
82132
##  [1806]    5.102233370   55.045924070   72.711627392   62.546075554   64.2046
33680
##  [1811]   79.729027776   85.386756004   91.566747600   97.203636465  100.2754
66904
##  [1816]   95.782750727   97.279981731   78.688900448   73.494080870   47.7159
92626
##  [1821]    7.381493935    7.469829056    1.053119145    1.049915034    5.0421
58748
##  [1826]    5.058392256    4.950580604    5.080539805    4.908158333    4.6693
51272
##  [1831]   30.924627572   21.345241248   19.483308742   58.964466929   91.7185
51385
##  [1836]   86.601464365   97.720953416   94.247093676   96.555128455   92.5257
77515
##  [1841]   85.961084845   69.583655514   85.010516257   67.118251580    6.4967
46568
##  [1846]    7.195118011    1.560906078    1.719409036    5.771459503    5.5740
80376
##  [1851]    5.414404516    5.152200438    4.952741989    4.968668384   53.1351
56729
##  [1856]   69.824403162   52.914494350   53.509340045   83.282035941   86.5258
00857
##  [1861]   84.582536323   84.938347870   81.909186995   87.058347895   82.1873
14546
##  [1866]   73.256695331   75.918152948   37.586031621   11.036335519   11.4668
11350
##  [1871]    4.883072710    5.259348336    9.640243313    9.496369545    9.0941
26226
##  [1876]    8.878946716    8.865774666    8.702151701   65.801935709   52.2672
57813
##  [1881]   64.417617511   66.887984501   91.686149981   99.253930416   96.1022
54736
##  [1886]  101.578743167  100.489242726   96.087272569   90.524789827   76.2930
77988
##  [1891]   66.419952420   42.324914495   11.179742201   10.467424919    2.5714
88502
##  [1896]    2.517731872    6.863700666    6.901597261    6.738043319    6.6355
07507
##  [1901]    6.734973852    6.706071807   60.351627811   44.155010576   53.8770
58383
##  [1906]   68.968962307   86.967147064   91.009200332   95.626818377   89.7047
89932
##  [1911]   92.291533202   85.531465578   83.033054699   82.250020714   83.7226
73616
##  [1916]   54.122034426    9.359453170   10.003594765    2.159963479    2.4195
11413
```

```
##  [1921]    6.768584089    6.949719568    7.076771405    7.139045129    7.1640
51285
##  [1926]    7.175936696   67.507780037   21.876774654   25.691534722   50.4812
22036
##  [1931]   90.779319038   87.438756646   90.840485759   86.685052022   90.1340
20053
##  [1936]   77.725376002   76.936224062   71.401679663   69.511992788   40.7578
89557
##  [1941]    9.630231568    8.885684333    1.333035503    1.489925808    5.8167
63250
##  [1946]    6.015023369    6.041209721    6.026921591    6.086268622    6.2022
36223
##  [1951]   62.009226908   81.306960099   59.645996257   60.844489907   87.5938
10546
##  [1956]   88.706793274   87.777766942   89.671083199   88.004824461   91.8509
77874
##  [1961]   84.561227718   77.074866469   83.479312539   45.464511433    8.7157
96117
##  [1966]    9.055390742    1.362171699    1.451304599    5.610645234    5.6868
46174
##  [1971]    5.770410937    5.791978411    5.754287676    5.658793499   53.5374
07132
##  [1976]   55.816510553   63.842025559   70.509353208   86.290242938   89.7234
04794
##  [1981]   90.894004060   95.923014734   99.251303444   99.389406372   91.2356
87179
##  [1986]   83.367540516   77.020980343   29.950551979   10.680929421   10.3861
73444
##  [1991]    3.247922471    3.424148398    7.530634765    7.339582171    7.2512
44744
##  [1996]    7.057382374    6.939501910    6.661977486   74.920670852   53.2718
37274
##  [2001]   59.068429732   68.715695974   86.110410592   89.193176839   91.8570
05534
##  [2006]   90.246517943   90.600455493   82.582300208   74.072599542   73.7537
75277
##  [2011]   78.582262390   39.132066727    5.257774544    4.884748152   -1.6368
51078
##  [2016]   -0.833531688    3.686664773    3.818382135    3.903099551    4.0770
24100
##  [2021]    4.920266702    4.880242911   77.966227173   49.629555299   58.2989
50735
##  [2026]   69.492900984   91.855639434   90.933744065   90.307602851   90.0734
40557
##  [2031]   89.639413755   79.976642574   66.597975105   79.569895872   56.4924
79792
##  [2036]   49.396708102    9.135949159   10.002713686    1.908345114    2.1295
53466
```

```
##  [2041]    6.351339617    6.297554489    6.083828912    5.918332576    5.5278
83981
##  [2046]    5.354468605   75.886135873   55.382221416   67.643198126   82.2440
25997
##  [2051]   87.043502495   91.381313702   89.945445393  100.081183493  100.2503
33800
##  [2056]   94.890877706   75.805913435   63.742438578   67.465749154   37.7519
31611
##  [2061]    5.865847253    5.475335672   -1.377713041   -1.248321382    2.9296
21909
##  [2066]    2.984545393    3.081798846    3.137257454    3.068469150    3.0150
14323
##  [2071]   47.997324816   69.428563788   83.714597333   84.461570604   94.6985
12024
##  [2076]   92.075756530   94.866969872   94.770712526   85.886739964   92.9782
07791
##  [2081]   73.912057429   88.187689278   89.510285959   48.146848909    4.3838
96437
##  [2086]    6.420104734    0.974059774    0.990361187    4.745724070    4.4982
47356
##  [2091]    4.273113329    4.001048149    1.752606114    2.620401155   52.6227
74158
##  [2096]   46.207754662   81.475363324   84.583848499   97.153049756   94.6595
17226
##  [2101]   96.819894182  100.360003084  102.184077818  101.762477854   97.1396
25001
##  [2106]   92.991915023   91.731766757   63.488631601    6.842347016    8.8996
79369
##  [2111]    0.682424751    0.611378561    4.569989335    4.521135774    4.5010
31081
##  [2116]    4.414393215    4.351878912    4.243562309   59.819045369   73.2663
76799
##  [2121]   82.315369363   85.500686126   98.019159513   93.685495980   98.0913
97513
##  [2126]  100.911098874  100.984037148   88.819931451   64.000077881   52.5327
22337
##  [2131]   75.318295415   52.765892918    8.662400732    8.933904575    0.9634
41300
##  [2136]    0.944920479    4.953688360    4.884013109    4.819101765    4.7738
40416
##  [2141]    4.689610772    4.684633885   66.208336164   60.968835876   58.9727
19583
##  [2146]   61.524119738   73.454716742   81.034705365   78.453552542   96.9762
45643
##  [2151]   90.522555916   68.492900745   44.854724545   35.250626180   46.8976
85589
##  [2156]   50.673948509    5.387648250    6.702188278   -0.634821071   -0.8281
47156
```

```
##  [2161]    3.370300343    3.409203930    3.450422573    3.455775297    3.8291
46952
##  [2166]    3.930651260   37.096402421   71.447316122   82.238772173   84.3271
76281
##  [2171]   96.155439128   92.308657326   83.593358865   80.406817301   70.6594
15071
##  [2176]   67.570519049   56.632846182   62.488779065   73.425640854   68.6502
12776
##  [2181]    5.317920869    6.920978206    0.177409334    0.191951108    4.2583
06148
##  [2186]    4.415055611    4.380557481    4.461840609    4.599899959    4.5798
41655
##  [2191]   43.863863089   57.236058664   80.107932232   84.790382396   95.1026
17000
##  [2196]   93.465789990   94.479097954   96.977509085   90.034083577   98.8886
57123
##  [2201]   71.315152141   88.485862462   74.092726330   79.629896494    3.4753
55736
##  [2206]    5.564995245    0.488353393    0.286005521    4.210137216    4.0012
38892
##  [2211]    3.797298689    3.524810625    3.229044472    2.918799490   54.0977
98685
##  [2216]   75.900983222   78.580250020   84.864679092   96.975473754   93.4652
68297
##  [2221]   95.330073079  101.115627939   98.110558372   90.850600881   76.5561
99798
##  [2226]   61.168295340   82.419534259   44.314433459    5.417753031    5.6988
05273
##  [2231]   -1.256039022   -0.835922736    3.422509689    3.459448973    3.4228
39753
##  [2236]    3.362923662    3.357287398    3.250934426   46.138202139   70.7352
23510
##  [2241]   62.223521740   64.706614482   75.272857357   77.946842905   77.7340
34671
##  [2246]   86.629730823   75.089903354   53.499147313   38.398253739   35.9759
48032
##  [2251]   52.224235257   62.392380953   -4.128823021   -1.171350821   -1.5410
03772
##  [2256]   -1.243777704    2.876124222    2.842612184    2.798404686    2.7414
61480
##  [2261]    2.915254809    2.887148049   48.749834939   66.416930504   79.5389
07271
##  [2266]   79.946161459   91.016691579   90.041953378   79.285605620   81.2732
41706
##  [2271]   71.225781040   57.238211370   62.445305242   71.212194786   79.5994
77381
##  [2276]   82.052370713    6.960824064    8.972313106    0.560088909    0.7606
12216
```

```
##  [2281]    4.871704885    4.822891564    4.731388634    4.643456958    4.6062
87097
##  [2286]    4.492854493   42.825205389   76.061708606   84.695683385   85.3212
88298
##  [2291]   96.306285753   94.366174627   95.618972068   97.275402488   81.1716
79754
##  [2296]   95.892903588   64.975368026   75.822621538   84.043075938   54.5012
32900
##  [2301]    6.708382118    6.734354606   -0.718287272   -0.472369652    4.0599
05945
##  [2306]    4.538210715    4.588454405    4.845041075    4.979002983    5.0101
24255
##  [2311]   75.457986707   63.538408832   62.782732631   70.234175306   82.8086
53762
##  [2316]   90.915880870   92.416587106  100.487829553   97.710908730   91.3098
99898
##  [2321]   92.813280930   83.380061678   54.237714410   41.844218905   11.8632
88864
##  [2326]   11.967471427    4.003347303    4.032902306    7.924714713    7.7878
73349
##  [2331]    7.790673575    7.768841657    7.589532841    7.501157969   46.9352
57552
##  [2336]   78.036195099   77.259506535   88.055266545  101.511112951   99.9363
65092
##  [2341]  100.607777824  101.434747915   96.490816517   90.180143155   87.0684
82204
##  [2346]   84.173747730   90.234950519   90.239560366   12.122430992   14.2827
43254
##  [2351]    5.616651417    5.808994928    9.997150096   10.004055309    9.9889
05100
##  [2356]    9.941428064    9.602423317    9.454804208   71.996374996   77.1152
99739
##  [2361]   84.182718816   85.136427859   97.117190026   98.241041223   96.9080
64339
##  [2366]  100.538967426   87.271493339   75.550512305   70.478814499   87.6759
32547
##  [2371]   98.810944451   95.119326313   55.534068812    8.422023816    3.3713
52298
##  [2376]    3.553258422    7.863740753    7.980102086    8.042536935    8.0528
89889
##  [2381]    8.137600360    8.172997916   42.338694129   72.765440475   85.5939
11298
##  [2386]   88.754011057  102.012892901  101.394377018  102.205654271  102.7651
19043
##  [2391]   94.043513193   99.702072369   87.242040975   83.461474722   81.0515
98938
##  [2396]   31.764256379   11.721303879   10.544761199    1.873893688    1.9930
51103
```

```
##  [2401]    6.191175044    6.311756769    6.410401276    6.424943328    6.4215
30754
##  [2406]   51.803211554   64.826037069   71.103380352   68.493510293   68.1230
31071
##  [2411]   82.015995833   90.642477180   93.271803267   97.403980125   97.1291
84875
##  [2416]   91.620340451   94.470154694   88.398210613   49.908722342   26.6804
33090
##  [2421]   11.807183488   10.515893591    1.770882873    1.821698852    6.0033
14269
##  [2426]    6.089782983    6.228745486    6.273797163    6.425198972   29.0229
16967
##  [2431]   35.087303691   87.162742325   86.524498405   83.106588336   95.5469
90530
##  [2436]   94.233014026   95.495548731   97.091721860   98.110032711   98.6248
24364
##  [2441]   97.241686976   95.928417559   78.865648278   54.293013925   11.4852
80289
##  [2446]   10.224222284    1.367084802    1.428035819    5.590353058    5.5906
69618
##  [2451]    5.535341137    5.424992163    5.485202107   28.168167706   48.1552
81357
##  [2456]   77.143907543   85.424240195   81.952930959   95.037089541   96.0286
99892
##  [2461]   96.851250629   97.294954673   94.322798802   93.270690678   84.5504
62008
##  [2466]   88.304183038   81.758138121   53.121104118   47.530180290    8.5482
09961
##  [2471]    0.952570452    1.165397812    5.483035781    5.472962451    5.5033
37896
##  [2476]    5.607433453    5.643799832   51.217821400   61.403097983   78.2898
49363
##  [2481]   83.917868610   87.028972740  101.473425087  102.952274064  103.9971
83449
##  [2486]  104.656388248  104.391937885  104.285125809   99.854433162   97.5654
39377
##  [2491]   69.655966921   22.345798932    9.535264770    8.600878807    0.9867
42129
##  [2496]    1.341280899    5.851354366    6.121711041    6.254220134    6.3408
09563
##  [2501]    6.372425167   74.723302899   43.245666406   88.143521626   86.9396
59796
##  [2506]   84.355327137   97.551822734   97.256999773   99.451732342  100.0300
64003
##  [2511]   99.847334142   99.813176863   97.338076018   96.389662131   68.3305
11574
##  [2516]   22.391276594   10.365237873    9.248784175    0.545022269    0.6016
50619
```

```
##  [2521]    4.727410296    4.667762777    4.578451501    4.499786080    4.3317
44878
##  [2526]   53.466152201   58.583556519   83.903358333   84.834965284   82.3258
04399
##  [2531]   95.288836720   96.084207293   96.979239986   97.338361704   96.9904
23598
##  [2536]   97.088969521   94.971738090   93.370300478   64.050424668   25.1420
19650
##  [2541]    8.969101089    8.067799279   -0.750970143   -0.822479086    3.3386
79591
##  [2546]    3.434328213    3.498075597    3.498930083    3.596547930   67.9586
17506
##  [2551]   51.373908541   75.705541846   84.099733403   81.887983165   95.1155
65610
##  [2556]   96.292934058   97.247746621   91.793379316   91.454651325   85.1964
30360
##  [2561]   87.917503713   83.997189428   71.140009472   21.792712006    8.7903
11762
##  [2566]    7.760933930   -1.042046814   -0.905031737    3.330762498    3.5287
61337
##  [2571]    3.738460083    3.866537250    3.900942510   59.840237654   77.6058
57991
##  [2576]   83.874444959   84.402804460   86.094226799  100.725917623  102.1517
00438
##  [2581]  103.347995554  104.073934936  104.429817983   98.128367379  101.5822
54017
##  [2586]   98.965034987   75.697624280   25.657296445   12.147281663   11.2653
60134
##  [2591]    2.226692733    2.438140776    6.703285796    6.815204856    6.8610
84237
##  [2596]    6.893473055    6.487878409   58.857288184   35.402559227   64.7402
59997
##  [2601]   82.104562929   86.738347902  101.988897386  102.067722650   99.9511
10636
##  [2606]   94.334928124   95.896163620   93.616236758   95.863653251   98.4171
48037
##  [2611]   75.626132174   24.834902191   10.783488734    9.436237347    0.6034
75970
##  [2616]    0.819479172    5.115106424    5.401981739    5.801058702    6.0914
18669
##  [2621]    6.106233508   58.074162845   86.880113590   85.013723236   86.4413
72320
##  [2626]   84.397557751   91.515123829   99.905051138  101.093780717  104.8290
13530
##  [2631]  103.315199879  101.441402110   93.758207765   91.219480487   67.8109
21215
##  [2636]   26.498034821    9.491271133    8.784595048    2.161033873    1.9954
58229
```

```
##  [2641]    5.878107724    5.693978920    5.528280575    5.320080599    4.5111
14482
##  [2646]   68.996344340   54.493847364   70.904828102   82.798402335   85.0094
06891
##  [2651]  100.847577978  102.692405627  103.811215011   99.595838007   96.9871
82601
##  [2656]   87.965911764   89.672158504   87.930341232   76.991517185   26.7884
94456
##  [2661]   12.290047788   11.154894294    2.051881827    1.930486698    5.8188
78767
##  [2666]    5.692823767    5.581925579    5.382546183    4.326690329   54.7128
16525
##  [2671]   48.244318227   66.662277934   82.652358624   85.767441569   99.6295
84767
##  [2676]   99.033411820  101.191007779  104.162136007  101.311563109   96.2975
86197
##  [2681]  101.050120701   98.342893888   78.845351434   27.869667445   10.1041
74793
##  [2686]    9.164310785   -0.004916879   -0.089010997    3.824627699    3.7104
20207
##  [2691]    3.576314855    3.476941755    3.402991059   61.556213877   30.9448
23412
##  [2696]   60.476503476   79.566895513   85.060677869  100.650392427  101.8163
24071
##  [2701]   97.103168764   89.641825826   96.453361298   90.798213119   65.2222
58721
##  [2706]   68.875930085   85.623682672   28.904308966   11.442585723   10.8284
51045
##  [2711]    1.539203324    1.561681212    5.652100849    5.603411041    5.5480
08227
##  [2716]    5.478189344    5.393525728   63.656382229   64.456365100   74.1628
28083
##  [2721]   71.983421543   62.773436338   92.072372530   96.928898574   98.9051
61840
##  [2726]   98.938667653   86.829890713   87.804644713   91.816960007   78.7136
12993
##  [2731]   56.939495707   21.356567466    9.920280517    8.620124180   -0.4699
55510
##  [2736]   -0.416140851    3.732601992    3.736465494    3.682885192    3.5439
28464
##  [2741]    3.236060126   61.439696417   34.642452621   67.657549623   81.2455
81201
##  [2746]   83.568780586   98.547183301   99.900396493  100.811235709  101.3744
94636
##  [2751]  101.055930779  100.526123591   92.881943449   90.886373754   77.5962
90606
##  [2756]   22.881089071    4.673453143    4.701511298   -1.080400062   -1.1213
51874
```

```
##  [2761]     3.035115441     3.060252212     3.068647433     3.005885266       2.7203
47404
##  [2766]    77.762968716    28.259161290    63.847947086    78.657948288      85.0815
67376
##  [2771]    99.488924590    98.576026935    99.899202997   101.712860716      98.4326
69271
##  [2776]    98.424835259    98.069910960    96.004568520    79.006786732      31.0262
07699
##  [2781]    10.515140321     9.821735773     1.009785110     1.165828987       5.3555
63556
##  [2786]     5.371361136     5.268507042     5.162007364     4.949236355      70.3670
98257
##  [2791]    31.470619459    70.986416389    79.419797713    80.697904827      94.4545
92807
##  [2796]    95.283958487    93.897823836    91.658337101    95.872231450      92.4915
82117
##  [2801]    65.571048999    62.307888709    78.765113070    28.348495366       5.4191
91268
##  [2806]     4.067268388    -5.577702067    -4.608956045     0.454273051       1.2172
32169
##  [2811]     1.588226831     1.865744455     2.397744511    69.127750996      35.4437
46799
##  [2816]    68.299130122    72.286307545    66.464459950    94.231385489      95.1531
67711
##  [2821]    95.938204973    93.287526541    73.909652278    47.984602066      60.9043
96301
##  [2826]    59.173326963    34.115696044    15.245888012     4.491856627       4.0399
68574
##  [2831]    -1.163077949    -1.180465639     2.897075694     3.125294657       3.3504
26729
##  [2836]     3.722934964     3.857812769    79.141861219    34.691307415      81.6662
60327
##  [2841]    83.622054634    85.199729458    99.761350722   101.017373306      95.3212
57583
##  [2846]    92.562198481   101.476194032   102.259115661    97.525618929      95.1761
89843
##  [2851]    90.203600516    34.328590702     8.099949849     7.950209697       0.0032
09522
##  [2856]     0.370369792     4.801806669     5.036616520     5.328173527       5.2693
83050
##  [2861]     5.383087456    86.150803915    33.333286083    81.427800617      81.5629
48108
##  [2866]    85.178913120    99.698120569   101.307704049   102.582003419     103.0013
31066
##  [2871]    90.427019316    98.901578743    82.530369018    92.577958218      83.7786
87637
##  [2876]    39.418471038    10.979591122    10.523107834     1.156557454       1.2202
91002
```

```
## [2881]   5.304876814   5.187624841   4.939916469   4.824975442   4.8783
03652
## [2886]  77.864496581  35.933276367  76.201396503  80.305492937  82.1649
64937
## [2891]  96.238765726  97.344839103  94.762659935  87.880131217  80.7409
99996
## [2896]  77.937703137  76.728170449  92.222138342  84.548293012  37.6547
40579
## [2901]  11.128145604  11.412307562   2.208123590   2.182977287   6.3535
90082
## [2906]   6.545604861   6.748203962   6.854624830   6.750400693  82.1992
85629
## [2911]  39.878324909  68.246198920  82.023805205  83.880808868  93.6434
25324
## [2916]  93.982934833  93.804792062  95.998415174  90.050903619  62.0652
60463
## [2921]  61.080699516  59.200080758  60.694442322  26.692751297   2.4626
91253
## [2926]   1.860380891 -10.683514798  -8.094651102  -2.731523024  -1.0676
91563
## [2931]   0.193251006   1.392840165   5.563728769  68.468312790  37.2709
04292
## [2936]  86.245165920  83.356108341  85.326821277  97.911722230 101.2021
77213
## [2941]  97.900223358  87.092733408 102.455622282 102.419484479  83.3839
57227
## [2946]  89.220787972  95.511390904  35.879289214   7.474575507   6.9266
76988
## [2951]  -1.730129478  -2.423443908   2.841350206   3.475225509   3.8901
76451
## [2956]   4.181115636   5.691325591  72.169831250  45.548824531  79.2825
42819
## [2961]  86.844109221  87.768798338 102.097065268  96.710355399  96.8344
22329
## [2966]  93.875975364  89.339032652  93.837678160  67.827904034  62.7793
47807
## [2971]  50.137335785  23.066442985   0.972137220   1.378601022   1.4865
36608
## [2976]   1.840484594   6.199654657   6.428633158   6.568296575   6.5569
16298
## [2981]   6.513162735  82.736879681  51.947855885  82.316495195  83.7486
06462
## [2986]  85.313396489 102.894655443 104.262523575 102.538753676  97.1543
32019
## [2991]  91.225393548  81.491421591  56.441080849  78.712356885  78.3353
21953
## [2996]  35.376240653  12.583137522  11.550852739   1.862537782   2.0167
86256
```

```
##  [3001]    6.245143458    6.353920490    6.326152416    6.286354417    6.3733
76423
##  [3006]   80.045385884   43.970794352   76.862070773   82.347739800   84.8838
89992
##  [3011]   98.568022753   99.227324565   99.844472529  101.889882829  103.8309
94196
##  [3016]   99.014167029   91.725266326   69.546077730   70.888984255   45.5686
17089
##  [3021]   10.058735320   10.004624325    0.823327982    0.869440415    4.8441
76044
##  [3026]    4.738498204    4.650319503    4.685614507    4.714840058   50.9978
92286
##  [3031]   37.919700838   84.436847758   81.826083816   79.244258440   92.3118
20457
##  [3036]   95.188500467   97.343135336   89.953928887   90.359274996   68.0775
23276
##  [3041]   52.109147897   60.258769727   62.039198903   43.199214842    7.3658
99378
##  [3046]    7.840164025   -0.128287165   -0.195525275    3.718127894    3.4786
50504
##  [3051]    3.247918745    3.030530564    2.713983687   53.336301622   39.2889
07818
##  [3056]   77.968315666   79.418365705   80.477322705   94.480648804   90.3679
83034
##  [3061]   90.122892877   87.837142279   92.954628641   92.818917408   88.8308
03823
##  [3066]   83.066592372   70.181003418   33.494867485   10.840544043   10.4068
14184
##  [3071]    0.825157477    0.785314762    5.066378124    5.014485920    4.8677
62975
##  [3076]    4.637964242    4.181739955   67.848347494   43.340711671   81.1769
78250
##  [3081]   77.226916167   77.875866359   91.844792041   93.466386986   95.6212
01195
##  [3086]   96.445592887   96.273824720   91.371116995   66.565478861   74.0853
97327
##  [3091]   74.119196768   31.715811570    5.884961697    5.653314916   -1.6819
57094
##  [3096]   -1.620955381    2.272263990    2.191939668    2.205246729    2.1726
13222
##  [3101]    2.362430128   67.606706206   45.800760657   83.799975371   79.3898
03121
##  [3106]   80.373531036   94.038813220   94.605455921   90.345168756   86.4078
17448
##  [3111]   85.627052005   86.673346201   86.262929657   77.977252460   67.8139
49070
##  [3116]   56.394300818    2.357226665    3.779891231   -3.218442603   -2.3621
46796
```

```
##    [3121]     2.240355270     2.465723384     2.420594897     2.342552761     2.4690
08315
##    [3126]    53.442872896    35.683278401    82.816531088    78.469899722    76.3557
06619
##    [3131]    90.544611080    91.649856486    91.546001821    91.194440267    78.0101
25632
##    [3136]    64.126562984    61.767537123    69.407940599    62.589541651    64.4757
70610
##    [3141]     3.094956676     5.231110133    -1.278551601    -0.961583558     3.2273
60294
##    [3146]     3.265718994     3.230956457     3.107910974     3.237782025    64.6874
37969
##    [3151]    43.634298296    68.911802471    73.445362113    71.686143604    86.2736
56748
##    [3156]    83.407007269    84.240884184    89.322792363    82.729631955    83.3800
60705
##    [3161]    89.990854609    94.194991426    85.800396501    44.991924850     7.2777
34412
##    [3166]     7.742856017    -0.740694374    -0.693290507     3.488875423     3.5464
32148
##    [3171]     3.535297974     3.594537945     3.925718549    54.178016949    34.2709
35801
##    [3176]    84.631879412    76.873035902    77.297250938    91.463958562    92.5302
44727
##    [3181]    90.813691452    70.360475677    75.875115325    95.306164321    93.6666
70253
##    [3186]    96.876436492    68.005969083    73.937759488     7.771923367     9.1708
37722
##    [3191]    -1.782910061    -1.377643746     3.221438788     3.515711981     4.0354
38302
##    [3196]     4.377271788     4.745725772    59.536681801    43.958668328    85.9578
41199
##    [3201]    76.918611795    77.415865314    91.762769879    92.533382566    77.5158
47679
##    [3206]    76.199659977    74.861640756    66.569440184    70.890459581    73.8340
63626
##    [3211]    53.228683848    62.855436037    10.012845837     9.337786948    -0.6048
55400
##    [3216]    -0.638616593     3.388526947     3.302140101     3.332307699     3.4536
25527
##    [3221]     3.874354233    54.389512142    33.178725781    84.473920984    77.1125
57653
##    [3226]    77.794635704    92.291934875    93.253262545    92.278946036    92.3304
79361
##    [3231]    65.996148341    80.382221745    86.299961980    93.866667825    92.6517
80595
##    [3236]    72.808651313     7.386685203     8.185525040     0.824428781     0.9059
59043
```

```
##  [3241]    4.823448064    4.728049728    4.709920850    4.692166647    4.8248
59498
##  [3246]   68.611386354   43.470207752   69.485848108   74.622306228   73.5890
43911
##  [3251]   87.926456963   73.420071126   84.331296965   90.738121290   86.2604
69481
##  [3256]   79.656381950   93.674467642   98.420395949   91.241248475   58.7143
85279
##  [3261]    9.519820707   10.090000893    0.462681428    0.531380505    4.6796
13092
##  [3266]    4.676231535    4.604580360    4.543191089    4.422920849   55.3109
17214
##  [3271]   34.429417270   82.665470219   76.921840083   76.911343319   91.0797
64316
##  [3276]   88.274599468   89.288418606   66.284035333   61.480000061   92.9955
47090
##  [3281]   92.133899283   95.864211941   71.716245220   75.947960947    7.3334
42458
##  [3286]    7.977993294   -1.433988283   -0.974177569    3.255370761    3.2448
81535
##  [3291]    3.186024102    3.202269760    3.339424154   54.809787006   31.0035
84506
##  [3296]   85.083894418   75.809457717   66.716531610   73.305935102   82.4546
50715
##  [3301]   78.334515488   68.720532824   79.622968137   49.523251733   67.2752
36904
##  [3306]   76.173282523   58.871609204   54.374978368    7.866855756    8.7939
27524
##  [3311]   -0.453509878   -0.542437763    3.432891954    3.449134096    3.3685
72671
##  [3316]    3.253266695    3.063526107   54.602489459   30.623785661   81.3750
55597
##  [3321]   75.993078992   76.309480280   90.483123107   91.623832727   92.3392
22813
##  [3326]   92.744208707   77.080904072   84.325983069   91.761856140   96.1702
20241
##  [3331]   94.219847844   65.967308396    8.488715252    8.821589333   -1.4729
10149
##  [3336]   -1.462715916    2.628336099    2.712818826    2.665020434    2.5239
38001
##  [3341]    2.185376727   62.239859908   30.024840954   75.985950368   75.5898
39943
##  [3346]   76.140406783   90.047625293   80.895970966   89.584443218   92.3776
03341
##  [3351]   93.158404115   86.836502190   85.969591627   89.518776210   87.3115
42301
##  [3356]   64.037056849    3.827936657    4.858677837   -2.132230280   -2.1633
37115
```

```
##  [3361]    1.872607778    1.719496260    1.545740775    1.438713512    1.4237
25661
##  [3366]   56.780492302   37.808487149   77.057891412   74.730255628   75.2655
09331
##  [3371]   89.034554582   86.897273481   89.409409277   82.405739641   68.9139
42577
##  [3376]   90.197870875   85.102378162   88.612875075   86.222337278   61.0205
24581
##  [3381]   -0.627217875    0.614257378   -4.730731702   -4.528623127   -0.0019
89713
##  [3386]    0.336797624    0.621041031    0.714700244    1.050121745   61.5964
01703
##  [3391]   37.069898881   81.005507223   78.730963513   71.520521298   78.3687
63206
##  [3396]   85.249393356   90.699476825   79.470002260   91.462802444   72.3548
71958
##  [3401]   80.703500663   88.575391348   86.207228402   60.105576211   -0.1151
10398
##  [3406]    1.568186470   -3.018957474   -2.736371507    1.597085061    1.8020
67620
##  [3411]    1.984445095    2.111197987    2.444502214   58.224011972   41.6768
44444
##  [3416]   65.155892173   77.463329521   80.056827871   93.343132716   87.5824
99073
##  [3421]   88.404520300   85.474998609   94.068572194   90.614025004   85.8174
95101
##  [3426]   81.339087223   77.049348955   49.602550058   -3.011105977   -2.0673
96522
##  [3431]   -6.065915705   -5.720995976   -0.850640198   -0.383931231   -0.1367
65752
##  [3436]   -0.005286059    1.045679567   50.438184522   43.004422810   78.5773
69276
##  [3441]   77.903389628   78.910341604   92.872641170   94.031968525   94.4187
48415
##  [3446]   90.609682363   83.524229148   86.023703941   91.362647366   86.3419
41999
##  [3451]   65.187759913   81.349754475    5.225184749    7.508613726   -1.0352
02429
##  [3456]   -1.214077399    2.825777679    2.614127198    2.362366236    2.1686
26654
##  [3461]    2.009110011   57.473372444   52.305501947   79.510000470   77.7707
23284
##  [3466]   78.849357890   92.607226765   92.627732378   94.069697042   92.4761
99763
##  [3471]   76.531281289   83.560894486   86.268631897   85.735778858   69.5584
60769
##  [3476]   80.510217745    3.996930250    6.038431730   -2.153946610   -2.2670
05914
```

```
##  [3481]    1.737865918    1.696197421    1.630667980    1.577165113    1.4238
36943
##  [3486]   56.475153561   48.345807965   79.765041794   81.666274658   82.7235
30928
##  [3491]   96.310894541   97.063528775   97.514923844   87.490963174   90.2018
13618
##  [3496]   77.155721224   63.966053408   63.400010539   65.205961657   75.6260
52962
##  [3501]    4.587229503    6.432767295   -1.936205841   -1.938627521    2.0893
42692
##  [3506]    2.006837755    1.956194656    1.866095077    1.734198702   52.0586
84599
##  [3511]   45.838220862   65.112630795   78.766918193   82.347541957   95.7465
58745
##  [3516]   90.938022918   90.742079416   89.149146281   96.141287768   94.7689
18418
##  [3521]   88.250723540   87.030306215   84.130122281   66.703383975    3.8572
99016
##  [3526]    5.735757148   -2.396103052   -2.411379847    1.668162839    1.7228
76737
##  [3531]    1.751825359    1.764816514    1.532293234   58.727587476   67.8603
63106
##  [3536]   80.865891436   81.508008130   82.517703667   96.747318210   97.7799
86925
##  [3541]   98.408233437   95.747540227   89.160937569   89.672007904   91.0761
46734
##  [3546]   83.568100715   55.736968480   89.485658775    7.368608175    9.2662
15135
##  [3551]   -0.824597675   -0.873622255    3.164212216    3.149355699    3.1085
00012
##  [3556]    3.023326975    2.774676610   68.085569816   69.751309519   80.8274
89534
##  [3561]   81.803345929   83.009879840   96.620052108   96.841154732   98.1735
34022
##  [3566]   98.319994130   81.861184589   83.654803205   83.054106130   86.4460
14560
##  [3571]   72.625238570   82.463662176    8.374835165    9.952589267   -0.0571
31447
##  [3576]   -0.067172081    3.936763990    3.878601698    3.854487310    3.8557
62352
##  [3581]    3.741663562   60.301484985   66.406840621   79.604017152   81.9304
42966
##  [3586]   82.590082448   96.104670015   96.779798440   95.541772434   91.2579
25817
##  [3591]   84.587572500   74.578712938   67.146710921   65.031290295   65.7448
64261
##  [3596]   84.654176328    6.776776199    8.953449858   -1.028815500   -1.0724
32338
```

```
##  [3601]     2.960140825     2.957868087     2.954719860     2.951049359     2.9915
18484
##  [3606]    59.789995038    62.348435260    76.451137912    81.238867963    82.0560
67036
##  [3611]    95.362271932    95.975162906    96.642211221    97.252703764    96.2935
98695
##  [3616]    96.356313489    89.725669982    91.792757884    91.191264321    79.8186
71847
##  [3621]     6.109803761     7.922450734    -1.280350509    -0.983723050     3.0614
87259
##  [3626]     2.907676575     2.669285595     2.360871503     1.976918700    70.6609
50589
##  [3631]    80.284585418    79.736071705    79.693645010    80.835688255    96.1046
27387
##  [3636]    97.176322120    97.882446878    98.664433610    98.438913414    97.0470
56826
##  [3641]    90.603888111    88.058300241    77.913218556    78.688940806     5.7027
08030
##  [3646]     6.356583598    -3.066553294    -2.522745661     1.569587670     1.5961
15832
##  [3651]     1.552275327     1.386923322     1.094616843    68.467084042    77.1853
08580
##  [3656]    78.679298765    79.878217703    80.665662275    93.577066733    93.1719
51442
##  [3661]    91.849342597    90.743055301    84.746231242    86.695926027    79.6974
82144
##  [3666]    83.425268925    83.053104327    68.991013628     0.805699080     3.4339
01058
##  [3671]    -1.353065321    -0.725001086     3.314330256     3.157913566     3.1114
94644
##  [3676]     2.973287395     3.207467193    66.799601032    78.106425407    79.2538
28939
##  [3681]    81.579121845    82.132052559    95.452191134    96.329878448    95.4159
08448
##  [3686]    95.227896836    90.637264194    93.222174761    90.798711743    88.7547
62141
##  [3691]    85.884389174    87.933886402     3.534280424     5.311174936    -5.4512
82358
##  [3696]    -5.963071149    -1.669027140    -0.937489275    -0.558722403    -0.0340
10519
##  [3701]     2.702343058    66.718477164    79.742478991    80.784446462    82.6249
76592
##  [3706]    83.264130180    96.193861147    96.690486116    96.342807598    94.1551
21823
##  [3711]    91.978736021    91.225875652    74.463245469    67.600679298    82.4808
51363
##  [3716]    66.714885001    -3.381720124    -1.783843011    -5.624844848    -5.9505
62439
```

```
##   [3721]  -0.807724444  -0.217810089   0.109267906   0.341635357    1.7245
73672
##   [3726]  59.622360019  72.335640082  75.210894397  80.712736092   82.6282
61597
##   [3731]  95.413814165  96.664121436  97.323410823  97.731521662   92.1339
05608
##   [3736]  93.058775887  93.525905867  68.472610243  89.614811970   66.2992
54107
##   [3741]   2.940307253   4.092574900  -2.602373284  -2.304026213    1.8294
82521
##   [3746]   1.794570371   1.624139334   1.382642509   1.151804977   68.9530
96649
##   [3751]  76.361042792  75.719205700  79.665703748  80.732392114   93.9771
66544
##   [3756]  95.197570062  96.419987686  96.288926273  94.850245468   78.6375
96973
##   [3761]  54.757509013  76.475694816  80.055949404  56.527141857   -2.2687
30646
##   [3766]  -0.757745897  -6.095223671  -5.208327609  -0.751061403   -0.4765
38256
##   [3771]  -0.405228119  -0.460640035   0.203997740  62.719658677   69.3376
55041
##   [3776]  72.728013949  78.811410398  80.007397834  92.386325774   94.2425
64902
##   [3781]  87.021195857  91.733491244  77.702486481  79.567694047   47.4454
79724
##   [3786]  60.937784949  73.403914086  48.051378802   1.028446136    1.2655
13135
##   [3791]  -2.978374462  -2.641919631   1.469820434   1.447524328    1.4360
27800
##   [3796]   1.391686307   1.411539323  58.111860578  72.385615507   76.0114
17499
##   [3801]  80.663363540  81.852039496  95.524188935  96.826552446   97.4027
11563
##   [3806]  97.312714288  96.560589230  96.311042818  86.351030621   78.4807
57211
##   [3811]  88.494320470  73.120429026   6.171394294   7.663113839   -0.9561
92777
##   [3816]  -0.915114191   3.016747956   2.931936794   2.858591645    2.7813
58079
##   [3821]   2.586519064  49.069601146  69.712808924  72.423131909   80.4231
30998
##   [3826]  82.898825775  96.011719508  97.373136218  98.614100290   99.4804
75839
##   [3831]  95.319319073  96.333609647  95.589854278  56.393975294   82.5699
43736
##   [3836]  59.192729475   8.516029202   8.917242909  -0.866026737   -0.8815
32950
```

```
##   [3841]    3.121246239    3.026000481    2.956119841    2.900938345    2.9324
24288
##   [3846]   64.543674586   70.817473596   73.590749734   80.944618664   82.8704
86492
##   [3851]   95.826291920   96.877736972   98.364624753   98.849628589   98.9789
78987
##   [3856]   85.633538099   34.811836017   48.371629064   56.533603135   68.4451
18345
##   [3861]    5.809145522    7.376530522   -1.258602460   -1.110352743    2.9488
54202
##   [3866]    2.926937616    2.854883203    2.699835718    2.470490799   53.6963
95100
##   [3871]   68.597576299   72.684118940   80.132751021   81.640795640   94.2592
80079
##   [3876]   96.163539319   90.757921258   96.401331414   86.334783248   86.7017
88104
##   [3881]   67.524392022   76.818351525   85.649519708   50.882487487    5.8223
66790
##   [3886]    7.264677478   -2.048109288   -1.942342951    2.109051388    1.9239
66255
##   [3891]    1.796294465    1.750566727    1.744653991   48.403299771   68.4335
46713
##   [3896]   73.833610581   80.517015966   81.854373240   95.141463364   96.4261
52716
##   [3901]   97.952893057   98.780384286   99.009348855   98.789547379   94.5926
25986
##   [3906]   91.867393911   88.550444577   74.270325924    6.532156360    8.1104
24788
##   [3911]   -1.436056576   -1.317924431    2.882468570    3.064043275    3.1951
78638
##   [3916]    3.202550797    3.105154738   44.524445860   69.223307796   73.3741
59138
##   [3921]   80.239846293   82.385328552   95.735120362   96.953273420   97.7179
55401
##   [3926]   90.235833618   94.535019100   90.586792832   85.767427446   70.8476
74123
##   [3931]   76.514155607   65.102475003    7.440554009    8.967600784   -0.5084
83362
##   [3936]   -0.281262287    3.878418985    3.866029372    3.851723912    3.7447
45551
##   [3941]    3.572242797   44.047855362   63.984136943   71.511874433   74.6496
05518
##   [3946]   77.067029599   90.216627287   92.935057484   97.462396146   94.2075
71784
##   [3951]   93.439247522   92.895270955   61.903169131   59.044850122   58.9255
43070
##   [3956]   72.908306191    6.418739096    7.786177561   -1.685216603   -1.6639
31084
```

```
##  [3961]    2.437350699    2.353068800    2.260530544    2.233189454    2.1620
50491
##  [3966]   43.500570521   64.080314829   71.497336915   75.194873523   76.6533
31818
##  [3971]   92.914553021   95.320197787   96.568573257   97.293934276   97.2117
55056
##  [3976]   92.770017251   88.883604149   90.128987876   88.769110711   74.5024
69212
##  [3981]    4.689161884    6.075982908   -3.552499996   -3.583308670    0.4379
97997
##  [3986]    0.316127119    0.249631902    0.250675009    0.024565732   41.5691
89530
##  [3991]   64.986909719   74.202701435   75.059409033   76.063900402   89.9051
42452
##  [3996]   96.288446106   97.659444459   98.646440706   94.684304924   93.0628
97500
##  [4001]   91.056819864   94.102326527   88.424558653   71.784467607    7.0106
92620
##  [4006]    7.907602622   -1.993284712   -1.988535943    2.085789585    2.2457
92581
##  [4011]    2.300115545    2.382175800    2.217400985   37.812523273   67.5968
46313
##  [4016]   73.617997107   74.720977036   78.424979823   94.866827178   95.8626
39903
##  [4021]   96.663913450   90.520684845   93.799011513   90.776976608   86.2879
12164
##  [4026]   86.308498403   83.141772953   71.087789121    8.226785987    9.3028
39356
##  [4031]   -0.349256356   -0.112088864    4.179838596    4.339679235    4.4269
54692
##  [4036]    4.583324679    4.228953202   29.209532029   63.453640631   72.8146
26253
##  [4041]   76.762455169   78.490070896   91.928509793   94.371043405   98.1601
79556
##  [4046]   95.803085026   94.203788090   94.823687740   91.482521848   91.7508
70302
##  [4051]   87.853319468   71.268165184    7.689282883    8.436416983   -1.4425
58928
##  [4056]   -1.385308826    2.668269900    2.619546562    2.469209332    2.4161
59412
##  [4061]    2.368712003   32.288924080   59.859104597   69.913507332   75.0567
73018
##  [4066]   76.166512972   91.504165227   93.561876958   94.676756613   95.5414
93512
##  [4071]   95.620528339   91.991292365   87.683502649   88.656865385   84.7187
90583
##  [4076]   67.827677753    4.041694213    4.774112497   -4.397379423   -4.4361
09683
```

```
##  [4081]  -0.423851028  -0.546768970  -0.525253527  -0.177489796   0.0907
56601
##  [4086]  30.407725256  60.933878382  73.261520081  75.306649647  75.7012
67455
##  [4091]  88.648689515  94.019012910  95.426840364  96.317173004  92.9540
02688
##  [4096]  90.944503731  82.505579975  82.048376287  73.679067380  50.9763
15776
##  [4101]  -5.559216085  -3.296403150  -3.493938385  -3.071345237   1.2956
62388
##  [4106]   1.522154087   1.618556266   1.698030930   1.642831199  26.7111
85947
##  [4111]  66.125567115  77.423030340  77.231852206  79.459569516  94.9294
57896
##  [4116]  96.046342669  97.066997347  97.690348760  97.574679076  96.7150
99605
##  [4121]  86.862691579  85.522850604  79.995469828  56.540056604  -0.6197
41517
##  [4126]   1.598597904  -1.384993345  -1.204436616   2.981906408   3.0225
66950
##  [4131]   3.120653133   3.191588011   3.215971994  23.360156108  56.3007
04945
##  [4136]  69.954445817  80.024971562  81.867950916  94.545276886  95.6548
76052
##  [4141]  96.839756172  97.498902745  96.673604465  95.621905184  81.2157
50084
##  [4146]  62.463552997  70.558537343  61.421561440   7.696724537   8.4803
58918
##  [4151]  -0.327950385  -0.343031850   3.632172120   3.565067165   3.5021
58013
##  [4156]   3.450962739   3.384550517  24.258227368  51.341613134  65.1935
76445
##  [4161]  78.409305940  82.392530196  94.817782166  95.760212667  96.8062
59128
##  [4166]  97.477220044  97.669310294  97.200036924  63.249197531  47.1101
40229
##  [4171]  43.120621154  47.288266744   1.172031219   1.607494189  -3.5315
82215
##  [4176]  -3.032770591   1.850041843   2.241477504   2.464737999   2.5448
60211
##  [4181]   3.040999320  12.595406485  49.511192553  64.494816475  79.6638
52563
##  [4186]  82.594585456  95.717551406  96.903275947  97.803085424  98.3905
38456
##  [4191]  98.821227715  98.452642181  93.711918356  89.645252932  84.0246
88746
##  [4196]  61.466936812   6.274336114   7.499779385  -0.875566280  -0.8211
36294
```

```
##  [4201]    3.206096754    3.020305196    2.934670522    2.911793775    2.8795
83424
##  [4206]   23.005973468   56.284437613   72.285124781   80.379567951   82.1991
33819
##  [4211]   95.898205935   97.390122412   98.573950041   99.168638487   99.6735
23292
##  [4216]   99.315477171   96.492083455   92.235894529   84.183648865   63.3718
89559
##  [4221]    6.798327331    7.445564901   -1.789978950   -1.777461168    2.2869
36945
##  [4226]    2.217058819    2.027706904    1.855855524    1.719562143   10.6824
85836
##  [4231]   49.939514776   63.988226297   78.597312957   82.922371791   96.6225
63580
##  [4236]   97.678282201   98.722484459   99.376359811   98.691085993   92.1476
25042
##  [4241]   82.959509635   58.594123579   59.129620776   45.751512244    9.5696
77154
##  [4246]    9.159904848   -0.213224002   -0.085831473    4.073130236    4.1264
75153
##  [4251]    4.134089028    4.121891388    4.196251924   19.609008521   45.3509
21738
##  [4256]   63.806516820   79.362130911   84.390000912   97.636497508   98.7530
96717
##  [4261]   99.609680556   96.231508321   90.792297391   79.656762583   67.0983
34441
##  [4266]   46.408015585   42.434239545   51.179667704    8.427243681    9.0010
42122
##  [4271]   -0.361170296   -0.218666723    3.974555266    4.084951094    4.1383
13618
##  [4276]    4.187678184    4.203731449   15.105741375   44.303369568   62.7157
57918
##  [4281]   79.256258440   83.227193277   97.345146748   99.111169426  100.0802
27529
##  [4286]  100.432204795  100.913732112  100.276537053   97.727585115   90.3776
86982
##  [4291]   82.523049171   60.727385011    8.182112187    8.848636327   -0.6165
28018
##  [4296]   -0.585291618    3.410501266    3.282925324    3.014707117    2.7577
91171
##  [4301]    2.317500594   23.419442252   49.280129608   68.854614948   80.6373
39154
##  [4306]   83.330243150   97.415655477   98.854308822   99.849339793  100.1859
46546
##  [4311]  100.669880458  100.105557581   98.128031110   89.433441886   80.1414
29108
##  [4316]   61.408241719    7.995975264    8.741001861   -0.586549887   -0.5491
93175
```

```
##   [4321]    3.523492312    3.502696004    3.469839032    3.430384183    3.4515
## 95648
##   [4326]   16.076532067   50.879431785   69.196726220   80.259716179   83.1531
## 61941
##   [4331]   96.642126421   97.922634441   98.993573401   99.517422109   99.7013
## 40186
##   [4336]   49.829712965   53.014774259   44.453126030   55.605473314   44.1746
## 99767
##   [4341]    8.729982731    9.009207970   -0.205887831   -0.223327776    4.0037
## 06267
##   [4346]    4.102234244    4.051381286    3.952046191    3.864815354   15.1092
## 33506
##   [4351]   48.613598726   69.790329446   80.837980648   82.929354690   96.2429
## 68915
##   [4356]   97.447511455   98.507932025   95.679715083   91.111630394   81.5143
## 77299
##   [4361]   87.583963141   79.415111063   72.311578400   53.052890437    8.2075
## 25307
##   [4366]    8.528037434   -0.682825904   -0.691023906    3.362181487    3.3043
## 23506
##   [4371]    3.163647942    3.059658760    2.896345693   11.931236522   48.7924
## 53492
##   [4376]   69.198685837   79.861931924   82.114029515   95.582427626   97.1851
## 77001
##   [4381]   98.127652843   98.591367507   98.967868999   98.560230534   96.8759
## 99625
##   [4386]   89.643630023   79.771215231   52.534183549    8.046306861    8.2872
## 76292
##   [4391]   -0.840970098   -0.864743849    3.199864684    3.170637368    3.1027
## 92735
##   [4396]    3.041936636    2.992004155   13.223676554   47.975094241   69.6872
## 82910
##   [4401]   80.203975846   81.477964185   94.743906134   96.154702299   97.2580
## 67100
##   [4406]   97.722156198   98.148500077   97.899434474   95.994089571   87.6787
## 19980
##   [4411]   77.830720753   52.284090638    7.535888321    7.752712693   -1.2284
## 91020
##   [4416]   -1.243685100    2.816286113    2.827572960    2.812566105    2.8235
## 97821
##   [4421]    2.707397916   13.257169072   48.361402785   70.511747513   80.1288
## 05752
##   [4426]   81.543435864   94.443561709   95.846127568   96.930780658   97.3005
## 84508
##   [4431]   97.855819752   59.586799118   57.254999887   52.224412968   60.0777
## 33136
##   [4436]   47.350879944    6.567611527    7.137131749   -1.622162721   -1.5699
## 95924
```

```
##   [4441]    2.470174116    2.507218695    2.549279236    2.524971474    2.3862
38859
##   [4446]    7.689110509   46.949523291   71.213101911   79.501025398   80.5367
46415
##   [4451]   93.370297857   94.727562095   95.773135565   96.395349127   97.1520
58353
##   [4456]   96.973588931   93.081478598   84.615900071   73.502210213   46.5895
63031
##   [4461]    3.509287243    4.259686708   -2.475570710   -2.551507954    1.4482
30635
##   [4466]    1.409075627    1.376822806    1.257760309    0.956650524    0.6025
55415
##   [4471]   42.589553750   66.881425274   76.721625065   78.705437456   91.5402
41005
##   [4476]   93.328582146   94.515747494   95.574114232   96.400076417   96.7267
24912
##   [4481]   94.750713465   86.646387061   74.982796144   46.282827721    4.7184
46452
##   [4486]    5.256728804   -2.194582143   -2.294758634    1.685924052    1.6509
38300
##   [4491]    1.682258817    1.556163076    1.318449184    1.040278891   41.1653
99643
##   [4496]   65.202323417   77.539912481   79.803040868   92.494185065   93.9743
37648
##   [4501]   95.463233303   96.422571033   96.410705026   96.260150816   91.6514
53936
##   [4506]   81.124284380   70.569856150   47.393309282    4.161509084    4.6309
80781
##   [4511]   -2.168498561   -2.200392582    1.648973196    1.560551908    1.3954
45815
##   [4516]    1.215152978    1.144741783    0.977082298   38.803886864   63.8663
34953
##   [4521]   77.494696232   80.227158900   92.585984136   94.275460647   95.5921
11369
##   [4526]   96.246636673   79.656901387   61.769974096   64.488389685   56.9010
97262
##   [4531]   43.909947460   42.121664688    1.701705376    2.300410607   -2.1709
23268
##   [4536]   -2.266204518    1.697466372    1.240972960    1.129260178    0.8859
69056
##   [4541]   -1.657261730   -2.337681642   24.549881223   46.472965116   48.4718
61667
##   [4546]   62.049761126   88.951664650   89.642409927   89.295765695   92.7231
31187
##   [4551]   90.311849093   95.449624992   85.584463843   73.129895972   46.5746
32479
##   [4556]   23.582634351    2.019461910    1.607904541   -1.765849817   -1.8409
76959
```

```
##  [4561]    2.093816520    2.048886307    1.990190282    1.853159742    1.8852
26086
##  [4566]    1.789381960   39.125954335   45.312569708   63.347177354   83.2995
19132
##  [4571]   93.768881129   95.034578708   97.834727615   94.379162328   94.7327
68082
##  [4576]   99.519051079   95.046634409   77.781025567   71.607424355   43.6895
23452
##  [4581]    7.831254458    7.538946517   -1.206340635   -1.099124564    3.1864
75239
##  [4586]    3.357875227    3.339735283    3.220545081    3.042490118    2.8660
90561
##  [4591]   37.928854224   64.112799678   78.854086018   82.337104342   95.4192
22794
##  [4596]   97.163711155   98.557186954   99.480678649   99.766083278   99.4147
86845
##  [4601]   95.983157284   81.584179057   67.081398205   43.107312843    8.9046
53792
##  [4606]    8.538488812    0.423889495    0.512680079    4.538936482    4.4292
30499
##  [4611]    4.293730736    4.133920184    3.904788198    3.793651478   37.4285
54897
##  [4616]   62.433494598   78.561078374   83.611721185   96.555931782   97.8874
10283
##  [4621]   96.153113520   98.825128364   85.741074840   70.894445145   70.5018
44972
##  [4626]   59.514374918   45.071122210   38.313394015    9.827663745    9.2101
47266
##  [4631]    0.509412629    0.388766816    4.325781847    4.251152390    4.2122
74028
##  [4636]    4.129584662    4.080818848    3.987865623   27.516495908   50.2388
35435
##  [4641]   57.360494842   70.064487309   96.120024819   97.996872472   96.7880
67957
##  [4646]   98.501318410   95.801331909  100.082461410   96.244320211   79.7589
39263
##  [4651]   52.148799250   22.581651120    7.942381445    7.758161051   -0.2477
67923
##  [4656]   -0.202063192    3.824153532    3.783217926    3.678774652    3.5917
80776
##  [4661]    3.537238079    3.442491679   36.958020115   48.329529974   65.5227
30857
##  [4666]   83.073577733   95.216948557   96.128967939   98.414284503   95.5909
88961
##  [4671]   95.632863120   99.580459744   94.778142080   75.653512206   64.7010
51922
##  [4676]   31.629539915    6.860810563    6.268432375   -1.622932338   -1.5660
94964
```

```
##  [4681]    2.527180005    2.562746623    2.481070507    2.364904132    2.7116
27504
##  [4686]    2.795803686   34.473875565   64.446730678   79.857201447   82.9517
38324
##  [4691]   95.630722073   97.097605171   98.032436683   98.515241721   98.7769
27021
##  [4696]   98.439608690   94.691838396   79.164488865   60.995706418   28.2899
43587
##  [4701]    6.877271448    6.415333297   -1.162539388   -0.920470501    3.3386
21551
##  [4706]    3.407634995    3.503459385    3.595094398    3.832848434    3.6962
82043
##  [4711]   34.769191829   63.077484866   78.303705221   82.271032765   94.7841
45259
##  [4716]   96.235542623   94.860904660   96.739427439   97.658528363   97.8635
66835
##  [4721]   93.144358077   77.049376575   58.351637507   28.018920767    6.2441
72097
##  [4726]    5.827860044   -1.576005835   -1.433242100    2.580785138    2.4839
88483
##  [4731]    2.413255827    2.328307459    2.161490761    2.093341533   30.9122
73855
##  [4736]   62.118149522   78.583842342   82.185205482   94.840818311   96.1261
38867
##  [4741]   97.162757042   97.820593330   98.078231529   97.882058755   93.8424
99964
##  [4746]   76.659098514   58.760749408   28.329692918    7.512575315    6.8729
35383
##  [4751]   -0.889480195   -0.829627656    3.184336986    3.161333375    3.0934
14687
##  [4756]    3.037586564    2.732527724    2.584830930   31.551159316   60.9668
36550
##  [4761]   78.173392451   82.139344769   94.554640019   95.497889198   96.3441
05590
##  [4766]   97.001372506   97.441644941   97.448950086   92.633772199   75.5288
10462
##  [4771]   57.169760740   24.434836230    6.330175232    5.862377228   -1.2772
86436
##  [4776]   -0.959588300    3.427874375    3.609680738    3.712071147    3.7707
61488
##  [4781]    3.559990999    3.522027526   30.861215362   60.828829893   78.8098
99932
##  [4786]   83.262799692   95.441904956   96.843232131   97.700507332   98.1284
29344
##  [4791]   98.306271066   98.069222240   93.556272577   75.480597830   56.8254
50670
##  [4796]   26.896684420    8.119613403    7.552375470   -0.182779770   -0.1106
33797
```

```
##  [4801]    4.041267843    4.047847508    4.030658779    3.978884783    3.7958
89308
##  [4806]    3.652211989   30.280858757   60.820639110   78.550936290   82.1054
47883
##  [4811]   94.637571785   96.281917052   97.456374508   97.965709992   98.1699
49593
##  [4816]   97.782360830   93.020430622   74.533111907   54.524630201   25.5189
49631
##  [4821]    8.304408448    7.724851698   -0.038081149   -0.150338425    3.8541
22156
##  [4826]    3.800760937    3.732537939    3.665234022    3.520572235    3.4331
91616
##  [4831]   28.441215468   59.713963030   78.193725267   82.117635796   94.2500
45399
##  [4836]   95.301859217   96.074631088   96.804610681   97.138664941   96.2314
10007
##  [4841]   91.484354742   71.440653016   51.164892802   24.869639743    6.6402
35689
##  [4846]    6.005360967   -1.600819913   -1.486506602    2.652634659    2.6998
29926
##  [4851]    2.728292321    2.736522923    2.582417713    2.500000801   29.7481
32546
##  [4856]   57.149706077   75.266468104   81.254654934   93.533929493   94.4463
28124
##  [4861]   95.390278190   96.048936814   96.399087284   96.241570068   89.7374
34591
##  [4866]   70.453740387   51.214941383   22.575802612    5.116503147    4.7429
59693
##  [4871]   -2.415295337   -2.214269319    1.960556526    1.995716559    1.9626
84098
##  [4876]    1.889965456    1.832590071    1.796507236   27.866915001   55.6735
48824
##  [4881]   74.795227991   80.979054226   92.978035113   94.314773500   95.2222
22632
##  [4886]   96.051398699   96.609820526   96.618415704   90.407269913   71.1049
35231
##  [4891]   51.042942049   22.401514959    8.236844960    7.394340832   -0.0757
54518
##  [4896]   -0.022950317    4.163051765    4.306073982    4.313136244    4.2863
65491
##  [4901]    4.143890888    3.926173779   29.092651098   58.671061904   76.4794
25083
##  [4906]   81.460228530   93.499091972   94.592931370   95.470531959   96.1733
56399
##  [4911]   96.492860253   96.347581345   90.395178878   70.936882099   49.6836
32166
##  [4916]   21.399472995    7.462266948    6.819019018   -0.356965565   -0.2139
32450
```

```
##  [4921]    3.952902226    3.963603084    3.959237053    3.786203361    3.4847
33376
##  [4926]    3.120827098   26.808067216   56.511028092   76.072599128   82.3213
20362
##  [4931]   94.642599633   95.883383139   96.550134690   97.096164063   97.2712
14156
##  [4936]   96.267292129   88.777394027   67.678157018   46.753988147   20.7734
37593
##  [4941]    5.049500871    4.159172512   -3.162082419   -3.115151505    1.1337
61076
##  [4946]    1.140800142    1.072389919    1.050972414    0.688246496    0.6784
27740
##  [4951]   25.833313664   56.033050532   74.442893987   81.008057648   93.8650
56503
##  [4956]   95.520133680   96.395611239   97.118857393   97.284191466   97.0596
62593
##  [4961]   89.995133014   71.269554793   48.725059615   19.328552910    5.4054
00332
##  [4966]    4.407098066   -2.523308177   -2.270265096    1.982877102    2.0602
05586
##  [4971]    2.056217642    2.035669198    1.928162696    1.864600213   27.1972
59514
##  [4976]   58.048266894   76.040549383   81.636980538   93.757952921   95.0140
88444
##  [4981]   95.763245398   96.576550226   96.778716350   96.542846400   89.3391
64286
##  [4986]   69.772848380   48.750174619   16.580824004    6.689078325    5.5777
77192
##  [4991]   -1.487812417   -1.518014705    2.492244831    2.486427387    2.4560
03505
##  [4996]    2.408900920    2.484001424    2.333232180   26.923844262   59.9992
24383
##  [5001]   77.357555222   82.845212904   95.298671489   96.585086504   97.3313
03753
##  [5006]   98.057398394   98.205516303   98.048048668   89.767783787   68.8332
95700
##  [5011]   46.219728336   16.470303572    6.477540690    5.145461987   -2.3211
23556
##  [5016]   -2.473463540    1.519272266    1.661591972    1.773768959    1.8887
77522
##  [5021]    1.825233208    1.507171989   24.534162400   54.681985854   74.2430
61559
##  [5026]   81.483564156   93.322296975   94.695801909   95.206694887   94.4231
49077
##  [5031]   93.616025892   92.192578639   70.185208196   47.732071946   26.7838
09689
##  [5036]    2.467241548   -6.146193147   -4.811927079   -1.664535371   -1.5575
17723
```

```
##  [5041]    2.951381137    3.287637284    3.424927166    3.419025284    3.8606
86003
##  [5046]    3.686703609   24.216364888   55.689289219   76.128815583   84.1456
57741
##  [5051]   95.813118219   97.472529470   98.190782345   99.274427040   99.6079
76270
##  [5056]   99.658200682   92.574509806   71.807198415   47.444454879   17.4637
51972
##  [5061]    9.933410521    8.761696753    1.694115212    1.613911747    5.5493
61632
##  [5066]    5.387577947    5.230289906    5.072034721    4.770389808    4.6157
06994
##  [5071]   25.998114756   58.352648355   78.003941855   84.624189881   96.5237
78835
##  [5076]   97.849305257   98.521421885   99.209589636   99.427095022   99.0478
88774
##  [5081]   90.486969611   67.871389424   44.629432063   17.029049485    9.2761
41704
##  [5086]    8.459805770    1.579819187    1.461036410    5.368850721    5.2445
35856
##  [5091]    5.137504123    5.016668016    4.805590419    4.625541369   24.8486
06579
##  [5096]   57.324095991   77.824500639   84.771414667   96.490711111   97.7184
79153
##  [5101]   98.228571448   99.091161053   99.110557507   97.741047418   78.7880
49103
##  [5106]   61.260862238   35.734999478   11.917732453    6.664404183    5.4584
94753
##  [5111]   -1.188618528   -1.144359068    2.975468641    3.092158318    3.2347
25888
##  [5116]    3.194130363    3.354756514    3.407441956   25.465519733   60.0484
87555
##  [5121]   79.284426407   84.913044923   97.146027089   98.562693430   99.1319
67123
##  [5126]   98.756508428   99.103171804   99.203604235   91.122853026   67.8477
84961
##  [5131]   41.244230650   13.079755929    7.639500402    7.009982926    0.6659
48073
##  [5136]    0.960236616    5.056544351    5.099111239    5.068761127    4.9740
67260
##  [5141]    4.762073935    4.612780694   24.789293357   59.266541676   78.7701
87133
##  [5146]   84.891715190   96.720637190   97.922543267   98.575015569   99.3278
07818
##  [5151]   99.394403021   99.141424314   90.582927515   66.417781796   40.1046
99110
##  [5156]   11.808383380    7.776711246    6.874086237    0.683515673    0.8434
86535
```

```
##   [5161]     4.985079049     4.987802992     4.976409866     4.936037894     4.7878
31679
##   [5166]     4.686819100    24.882383225    58.985164914    78.827435589    84.6512
56870
##   [5171]    96.132457741    97.224655310    97.649914644    98.011452602    97.9187
26638
##   [5176]    97.394309418    87.966636204    61.944714341    36.577917396    11.6049
67007
##   [5181]     5.966902768     4.973689919    -1.205809710    -1.058529093     3.0795
90811
##   [5186]     3.180493758     3.254520090     3.291148304     3.283549706     3.2495
48983
##   [5191]    22.160354483    56.203180492    76.065286837    82.984906682    94.4048
81295
##   [5196]    95.529125709    96.277841449    97.346869162    97.403244973    96.4358
48809
##   [5201]    78.182303729    58.718684465    32.188519752     7.854153595     6.0766
71714
##   [5206]     4.840867107    -1.424545347    -1.295663393     2.874310521     2.9299
67813
##   [5211]     3.051893368     3.186793637     3.543435479     3.548538301    24.3800
47810
##   [5216]    61.417793409    78.825324401    83.681149569    95.500357945    96.9683
72986
##   [5221]    97.961691835    98.695536621    98.635704292    98.218775765    88.5377
95539
##   [5226]    65.401755425    35.459279763     6.240754078     4.150218699     2.9838
39506
##   [5231]    -3.066966104    -3.244130955     0.832137755     1.252494339     1.4517
59198
##   [5236]     1.626785033     2.327562372     2.449482340    23.626885587    60.3033
03137
##   [5241]    77.732301470    83.556934161    95.033690207    96.175921044    96.9172
16052
##   [5246]    97.299856555    97.113347964    96.766713984    85.490308991    62.6199
71746
##   [5251]    32.924913683     5.801623707     3.897898672     2.840566332    -0.9895
40274
##   [5256]    -0.707806636     3.555122724     3.606188917     3.662641303     3.6589
30060
##   [5261]     3.448298754     3.280182942    25.317356862    61.448237165    78.5581
93112
##   [5266]    83.589699378    94.916292851    95.929489237    96.221818444    96.9539
71368
##   [5271]    92.880044509    91.141572507    85.468770584    59.351846354    32.5487
84284
##   [5276]     5.658491300     4.035672879     3.087650345    -1.337913689    -1.3489
80988
```

```
##  [5281]    2.745396929    2.850542346    3.080302705    3.205997080    3.3407
36393
##  [5286]    3.419419887   23.592773671   62.015762236   78.631242380   83.7767
55308
##  [5291]   95.340278600   96.360850559   92.764630197   87.530357074   85.7862
66609
##  [5296]   90.762547477   85.011793868   50.259240689   31.139345868    6.0825
70786
##  [5301]    5.305984510    4.216393117   -1.160842970   -1.180076088    2.7671
52505
##  [5306]    2.673571933    2.518831555    2.326944275    2.281336424    2.1533
44875
##  [5311]   21.801216525   57.509049603   76.364446745   83.369536446   95.0128
17369
##  [5316]   96.453559120   97.438498222   98.278320845   97.987359426   97.5354
47901
##  [5321]   83.940831056   57.196769911   29.484232427    6.347705222    4.9914
36353
##  [5326]    3.570935850   -2.235270154   -2.360199790    1.659062770    1.6672
47544
##  [5331]    1.736353206    1.778627803    1.751324734    1.461527230   20.1352
79604
##  [5336]   54.484872492   73.734171637   82.676957436   94.240140575   95.5706
04216
##  [5341]   95.568399100   84.643582933   62.326590627   71.819157895   61.0387
79715
##  [5346]   54.077870775   25.248707088    1.278198893    0.741269752   -0.3110
47703
##  [5351]   -2.959215206   -2.990479339    1.038275262    1.048060479    1.0122
18187
##  [5356]    0.904070401    0.690456113    0.804576972   21.926592175   56.3960
74513
##  [5361]   75.191017802   82.632612273   93.437153904   94.233975105   93.6531
58796
##  [5366]   92.622321039   82.120336091   79.313288939   64.963962102   44.7273
31783
##  [5371]   17.081320352   -6.782934357   -6.518533020   -6.526012011   -5.4027
79374
##  [5376]   -3.907680348    0.469055078    0.589900374    0.622314819    0.5652
53760
##  [5381]    1.768141993    1.535329959   19.767463687   55.536287349   75.6029
06497
##  [5386]   83.085877407   92.324510716   93.939496170   90.756480730   84.7125
68475
##  [5391]   85.913274970   90.683795755   84.010938132   50.949116029   28.6401
30624
##  [5396]    8.075151001    7.139442198    5.862859554    0.011165199   -0.1120
29950
```

```
##  [5401]     3.857809315     3.781113952     3.743488881     3.715676375     3.7440
07991
##  [5406]     3.779344631    20.612962359    54.451391808    76.512503154    85.5368
08206
##  [5411]    93.236148386    78.947898770    93.941569308    95.008524021    94.4626
59226
##  [5416]    82.532811205    65.179646696    40.026450345    19.875384120    10.0550
91075
##  [5421]     8.710167211     7.918918008     2.111564263     1.984301020     5.8369
52886
##  [5426]     5.669646336     5.472051479     5.260170491     4.861275996     4.6051
13144
##  [5431]    22.231780508    52.422946366    71.511353645    79.164165687    90.1794
26356
##  [5436]    91.831112330    93.381555184    87.587098517    50.209281544    41.8929
01214
##  [5441]    33.162462401    33.210194180    21.474990505     6.042836287     4.7710
83797
##  [5446]     3.748183602    -1.554992724    -1.414053453     2.743853485     2.8197
77136
##  [5451]     2.880359377     2.973065291     2.905639312     2.873952359    22.0845
75864
##  [5456]    51.397121260    76.270071061    83.166803333    94.355298631    95.7560
83158
##  [5461]    96.676488714    96.407269410    92.999218021    92.516488103    78.7501
43654
##  [5466]    56.640085914    26.515223253     5.602131124     5.015379298     4.0909
11513
##  [5471]    -1.023767444    -0.973913577     3.103236259     3.044769657     2.9769
94602
##  [5476]     2.930472419     2.768224584     2.664234285    21.768474313    58.3015
25074
##  [5481]    76.428878941    82.291632875    93.454083664    94.830304710    95.0202
85979
##  [5486]    94.284355922    95.809624188    96.145180665    80.847795053    56.5541
96028
##  [5491]    25.597599265     4.382174921     4.042075678     3.448055186    -1.1598
72150
##  [5496]    -0.957070282     3.324765177     3.498794704     3.738151058     3.9074
50771
##  [5501]     3.938987573     3.667720383    18.259753996    50.190386525    72.0144
79729
##  [5506]    81.881194370    88.704438604    76.687346746    88.434288192    90.8179
56325
##  [5511]    90.444119393    79.372343980    57.159792239    33.732951604     9.7248
56743
##  [5516]     2.770850416     2.387299437     1.941615676    -0.277901120    -0.1922
36256
```

```
##  [5521]    3.937327472    4.024825811    4.048385808    4.061282009    4.3015
96590
##  [5526]    4.308194979   20.981014946   52.448976563   72.053406560   80.9267
40625
##  [5531]   91.340488623   92.892938925   94.330266825   94.661292992   76.2277
15996
##  [5536]   60.179057596   34.491916046   17.179404166    2.000234225   -6.1435
35394
##  [5541]   -5.056602317   -4.714227483   -1.697358619   -1.303242538    2.9442
91152
##  [5546]    3.173361407    3.417950299    3.384547362    4.093655687    3.2908
71223
##  [5551]   18.122722937   51.943849567   75.694911818   84.591306308   97.4031
64813
##  [5556]   99.125125921  100.047526894  100.580793961  101.319217853  101.3426
59158
##  [5561]   83.699183966   60.584606887   31.215112059   11.301941743   10.5582
10412
##  [5566]    9.433483942    3.940924676    3.809130297    7.752507638    7.6610
14210
##  [5571]    7.595271809    7.554144230    7.515525191    7.451136683   24.8543
13386
##  [5576]   63.764056664   81.520217705   87.968707390   98.855740066   99.9873
93532
##  [5581]  100.109671867   91.067987401   97.066253653   84.871098073   72.5030
68156
##  [5586]   55.162840139   25.124985267    9.784331662    9.008387149    7.9264
29310
##  [5591]    2.653494918    2.519533476    6.447654468    6.261712010    6.0553
39638
##  [5596]    5.838724643    5.513441554    5.253257271   19.081940878   47.6070
17204
##  [5601]   74.296783732   85.489123507   95.900095264   71.594464062   71.4238
18688
##  [5606]   73.324038325   81.311210127   79.548904181   65.959226759   51.3745
55018
##  [5611]   18.327314325    9.108947240    8.386309799    7.484055170    2.3689
87601
##  [5616]    2.332182690    6.345849449    6.241069729    6.170270009    6.0950
04266
##  [5621]    5.876816858    5.729967888   23.047635695   60.784352380   79.2055
20106
##  [5626]   85.428687386   96.541172333   97.697058753   98.459974242   98.5699
70920
##  [5631]   98.198956964   97.901011087   81.666578853   54.292415044   20.8486
72164
##  [5636]    8.672740164    8.258518959    7.555362049    2.484794022    2.4306
75517
```

```
##  [5641]    6.540383277    6.564730905    6.534237723    6.526931699    6.3700
35716
##  [5646]    6.222590978   23.544331134   59.610949847   78.375003070   85.3501
44014
##  [5651]   95.894794586   96.811878092   97.150383178   97.801656784   97.5018
75944
##  [5656]   97.107016505   77.610372013   53.160017862   23.401983786    7.6123
37318
##  [5661]    6.801156571    5.960698799    1.012452672    1.056925349    5.0410
12184
##  [5666]    4.942873934    4.834609030    4.728751786    4.432360920    4.4229
71105
##  [5671]   18.483484844   56.694674641   76.435323618   84.318293782   94.8340
93448
##  [5676]   96.161379881   96.521995796   88.684599035   93.278444675   82.6989
71865
##  [5681]   62.606825241   42.247552038   11.191315989   -0.920375712   -2.0016
28364
##  [5686]   -2.690077365   -2.516954255   -2.449310391    1.782273405    2.0796
57045
##  [5691]    2.147335993    2.169569300    2.649434543    2.398451406   17.1007
90317
##  [5696]   48.229028479   73.411809129   83.489207549   93.857858254   74.1473
34889
##  [5701]   72.701505484   73.895680037   80.044342701   77.983761399   51.4807
77005
##  [5706]   34.465118380    2.182633168   -5.316196280   -4.194535597   -3.5032
26012
##  [5711]   -0.190819145   -0.034744272    4.048520555    4.076533519    4.0374
12150
##  [5716]    3.993923878    4.151310386    4.079021464   20.690029869   59.1637
55456
##  [5721]   79.687467756   85.698804024   96.657726773   98.112423989   99.0374
18543
##  [5726]   99.532218505   99.605416812   98.612140086   78.986315192   54.4848
73658
##  [5731]   21.272426388    9.483047290    9.143405965    8.401460249    4.0957
30137
##  [5736]    3.991859436    7.903507114    7.725975265    7.497937850    7.3047
12328
##  [5741]    6.909647008    6.666438193   23.708149201   56.770927959   77.6857
06336
##  [5746]   86.678525167   96.693042853   97.455387497   98.010652741   84.6978
10462
##  [5751]   58.692128459   76.340949094   54.303942814   33.026586917   21.7808
01276
##  [5756]    8.362618603    7.571555511    6.895397611    2.329315387    2.2275
55024
```

```
##  [5761]    6.169055920    6.060557401    5.891462986    5.733655745    5.7329
28872
##  [5766]    5.678082426   15.041839138   49.351128794   75.369545699   86.6591
83441
##  [5771]   96.791065314   98.118547989   98.945807557   99.338173705   92.5351
36571
##  [5776]   63.674149438   49.738823003   37.551543240   19.140931093    8.8654
47372
##  [5781]    7.833402128    6.909481631    2.230492535    2.140505010    6.1346
79654
##  [5786]    6.064121648    6.041371210    6.055135857    6.030536916    5.9435
86077
##  [5791]   19.209144913   53.608351442   76.741129274   87.001807291   97.6820
55293
##  [5796]   99.277799100  100.257563839  100.746077709  100.688340580   99.1847
82589
##  [5801]   76.137185606   51.216739232   19.901078357    9.984604145    9.5069
42441
##  [5806]    8.582724638    4.092071131    3.942578089    7.840375842    7.6721
01587
##  [5811]    7.492480360    7.326088977    7.024572886    6.845003914   22.1920
82476
##  [5816]   53.686510385   76.873692940   87.261109608   97.798363066   98.9456
64507
##  [5821]   99.655119704  100.091894632  100.211026906   98.185053737   74.1532
98583
##  [5826]   49.523821295   18.338836293    9.557419748    8.777108288    7.9159
69962
##  [5831]    3.425872537    3.489791103    7.563395448    7.600357899    7.5429
41435
##  [5836]    7.434352405    7.154587845    6.984737906   20.130020000   51.9144
58587
##  [5841]   75.650065441   87.713579959   98.291583007   99.568046527  100.4119
11809
##  [5846]   89.436345702   66.736285271   78.636257848   53.928286491   32.2125
92206
##  [5851]   19.502390774   10.270851779    9.503371108    8.593086511    4.1378
40440
##  [5856]    4.052262212    8.050295096    7.924272847    7.796860101    7.6627
20658
##  [5861]    7.486669566    7.326464165   16.648335482   49.184276931   75.9689
92914
##  [5866]   87.554672880   98.199133922   99.715502148  100.705430170  101.0478
61298
##  [5871]   95.501899343   70.103069169   51.060664770   36.083511067   16.0220
01636
##  [5876]    9.794418485    8.769586477    8.075189582    3.868865291    4.0203
81951
```

```
##    [5881]      8.086233718      8.091353307      8.034696085      7.975885771      7.8007
24979
##    [5886]      7.710405762     20.361226529     54.226718560     77.351328042     87.3424
61083
##    [5891]     97.637397887     99.097548999     99.926688042    100.359834818    100.7005
53437
##    [5896]     98.603806568     74.856218088     48.324099963     18.002410050      9.8743
22209
##    [5901]      8.811474621      8.001552655      3.688523998      3.610689638      7.5260
99431
##    [5906]      7.497771076      7.448840392      7.254515830      7.106276363      6.9399
67974
##    [5911]     21.394146960     54.625073063     77.213173912     86.622930496     96.9932
46484
##    [5916]     98.269866317     98.994734262     99.564964526     99.818054101     97.5845
49746
##    [5921]     73.822410653     46.982779204     15.191960642      9.571406327      8.5892
91185
##    [5926]      7.875780627      3.693820526      3.657974658      7.648021965      7.5995
87009
##    [5931]      7.515957325      7.486534122      7.243876087      7.258984848     20.5010
98948
##    [5936]     54.134687163     77.270979168     86.619787350     96.759149624     97.9194
01852
##    [5941]     98.705679906     99.260633410     99.581825199     97.079079942     72.6220
96532
##    [5946]     46.042113087     15.532926404      8.807837320      7.785344983      6.9262
66337
##    [5951]      2.779548691      2.807029415      6.708297549      6.520669507      6.5285
87698
##    [5956]      6.303115830      6.177079054      6.074133027     19.522772906     53.4872
75175
##    [5961]     76.878328946     85.777826625     95.613251101     96.699814860     97.6165
90446
##    [5966]     98.160353485     98.572416640     96.055618356     72.758489700     45.5232
83731
##    [5971]     13.423010849      8.128941242      7.222433243      6.560802374      2.6589
03222
##    [5976]      2.630451077      6.617088649      6.568778322      6.470937117      6.4657
65182
##    [5981]      6.460195601      6.487496360     18.925299499     53.584593202     76.8517
81804
##    [5986]     85.764843964     95.275799588     96.031065054     96.326054710     96.9559
57219
##    [5991]     97.354304859     93.971013961     69.960834367     43.028417047     11.4286
07188
##    [5996]      5.551898883      4.141993047      3.407387022      0.086916264      0.3293
96768
```

```
##  [6001]    4.587878803    4.510177320    4.231256261    3.978565663    2.9514
24973
##  [6006]    2.965890547   15.087807081   48.939332655   73.773457469   82.9479
77860
##  [6011]   92.866243860   94.733590385   96.106333792   97.105486258   97.3915
55184
##  [6016]   94.270168262   71.011196128   44.002121074   10.900434854    5.2022
27274
##  [6021]    4.298277820    3.535071073    0.223136365   -0.038087159    3.7345
70303
##  [6026]    3.771597558    3.765326861    3.751160847    3.458374486    3.3314
20581
##  [6031]   11.723791406   50.646924230   72.753325509   84.064112658   93.0957
83707
##  [6036]   94.083321068   94.848358076   95.751604314   96.376011471   92.5983
47063
##  [6041]   69.307228474   42.538178650   12.226597012    5.840451326    4.8493
85201
##  [6046]    4.044983249    0.661911200    0.781809972    4.893217293    5.0915
11503
##  [6051]    5.274957627    5.348124961    5.213187436    5.214084397   13.9511
19867
##  [6056]   47.546497511   71.057644445   85.072661699   94.684589265   95.3170
35067
##  [6061]   96.168433472   96.906459421   92.660402512   91.896101450   68.3322
55501
##  [6066]   42.520309528   12.214132696    7.536511042    6.712708389    6.0812
10835
##  [6071]    2.444263058    2.364592771    6.426189214    6.194955274    6.0303
20177
##  [6076]    5.926163890    5.541553847    5.380762180   10.174540989   46.8895
04186
##  [6081]   72.581058999   85.213370851   94.316028556   94.496158229   80.5797
87344
##  [6086]   82.729244077   86.143169926   72.987541676   60.085786996   33.1827
62819
##  [6091]    9.448955137    5.096620551    3.929771705    3.220090234   -0.1531
23949
##  [6096]    0.063300934    4.288606361    4.549939058    4.824510403    4.9283
66038
##  [6101]    4.301098187    4.177957180    9.084330142   33.163462625   53.1333
25325
##  [6106]   50.573841677   60.802467253   90.483067446   79.097464808   70.6455
39901
##  [6111]   85.259423766   64.355166498   43.765275201   33.690730758    4.5509
62284
##  [6116]    0.065466029   -0.092829508   -0.388443772    0.046688393    0.1701
46297
```

```
##  [6121]    4.389412297    4.518036990    4.743895957    4.852362666    5.0722
57345
##  [6126]    4.986109897    6.885168956   47.647754059   68.422695795   84.8831
69974
##  [6131]   94.620458008   93.672085342   94.628213576   95.500475146   95.6900
77569
##  [6136]   89.201062230   59.336566016   32.064597764    5.592487905    1.2166
96094
##  [6141]    0.338548192   -0.211122008   -3.485088427   -2.161998387    3.0768
56533
##  [6146]    3.519068440    3.783739764    3.857977629    4.750357070    4.4843
43758
##  [6151]    6.313069135   39.198338781   63.608608750   81.950872061   89.3902
63794
##  [6156]   78.216377171   65.476638392   88.630884744   86.336269819   83.3833
49452
##  [6161]   58.862045048   33.556756251    7.488975478    5.106711649    4.5374
89943
##  [6166]    3.952699179    1.497720984    1.516732550    5.443060859    5.3721
64800
##  [6171]    5.259738256    5.134712261    5.225793661    5.049872400    4.8923
58490
##  [6176]   40.019159163   56.063773012   82.324055784   95.157405646   95.1588
91778
##  [6181]   83.514267214   84.705559957   85.280330596   72.851974549   64.1449
91268
##  [6186]   36.648953657    9.718440375    8.833213044    8.226861926    7.5789
19442
##  [6191]    4.404755281    4.334130210    8.332554591    8.184406779    8.0485
17476
##  [6196]    7.925615463    7.681302855    7.546979538    7.449441248   33.1751
23270
##  [6201]   54.312262032   57.511143600   66.847187359   91.409792053   83.9013
10568
##  [6206]   76.470278764   87.681668495   61.921376096   40.841375094   33.1681
96719
##  [6211]   13.366438301    8.879409472    8.054977423    7.421863102    4.0215
69308
##  [6216]    4.102740943    8.321998434    8.205012184    8.014883425    7.9367
45310
##  [6221]    7.663480964    7.740168414    7.771943023   44.370890181   67.4651
87343
##  [6226]   86.311201037   96.267702773   95.359106215   96.007678186   97.5478
16410
##  [6231]   96.945266639   83.381933627   65.701074190   38.426810322   12.6392
74298
##  [6236]    8.973634029    7.968794207    7.543070618    4.653716347    4.6616
51305
```

```
##  [6241]    8.738123220    8.734658390    8.780478811    8.745093740    8.6398
44840
##  [6246]    8.692293315    8.646150891   40.825452503   66.879538298   85.8581
26580
##  [6251]   93.239612704   83.212078819   71.113275953   90.089625011   93.4137
62507
##  [6256]   87.353091861   63.551839447   36.179846236   10.375657384    8.8568
56072
##  [6261]    7.927549424    7.475903615    4.497152665    4.803093052    8.9875
08750
##  [6266]    9.047296458    8.885565589    8.733971154    8.591090521    8.4245
81214
##  [6271]    8.314583496   41.919995514   59.763152104   84.339799254   96.1694
22755
##  [6276]   95.712144359   95.160912751   96.245046846   95.118996601   88.2366
51599
##  [6281]   67.183690630   38.330819016    8.605376276    7.886436286    7.0569
30021
##  [6286]    6.835260843    4.276863913    4.733295177    8.744201339    8.7907
68983
##  [6291]    8.403862493    7.500244566    6.162894585    5.072115441    4.0772
17512
##  [6296]   35.877915466   63.847670917   83.335942413   90.514179446   90.3699
77816
##  [6301]   90.389859754   91.766115826   91.595560073   78.364512151   51.5981
57529
##  [6306]   28.562343430    7.392234987    5.558675386    4.774953757    4.2778
30267
##  [6311]    2.099695103    1.957517947    5.951861494    5.949018505    5.9826
08191
##  [6316]    6.070435430    6.257227846    6.204690503    6.064919580   39.2619
44245
##  [6321]   66.353140219   86.146139122   94.188881901   93.303444998   93.2224
04073
##  [6326]   95.251719766   95.003343595   81.431350094   60.452573632   33.7026
39053
##  [6331]    8.497126003    7.489901797    6.822603290    6.302375580    3.9024
39432
##  [6336]    3.714001463    7.593303159    7.371118004    7.142692373    6.9450
85872
##  [6341]    6.488682645    6.316174974    6.144416684   37.419064672   64.3619
78375
##  [6346]   84.936430197   93.230988588   92.018092835   91.358865577   92.2929
18937
##  [6351]   92.067803927   82.701618858   48.380326028   21.179099737   -2.2003
62701
##  [6356]   -2.590591698   -3.689598695   -4.745795559   -2.871126730   -2.3877
42386
```

```
##  [6361]    1.452011746   -1.077842059   -3.115063401   -4.536862975  -10.2886
78789
##  [6366]  -10.964199541  -11.012586412   18.587070548   47.883241371   69.9024
26791
##  [6371]   85.119707951   85.518717022   85.821223027   85.494000597   82.5650
42770
##  [6376]   70.262888204   36.056543056   18.483470091   -6.102246454   -6.1630
59573
##  [6381]   -5.753062906   -5.252187697    1.686013519    2.423113397    6.8622
52871
##  [6386]    7.083063344    7.193729528    7.171504156    7.127664443    7.0195
49598
##  [6391]    6.901767778   31.974330312   52.725601759   79.928372174   94.5235
72690
##  [6396]   92.524295634   92.254146238   93.901641933   94.104843575   86.1577
93798
##  [6401]   55.185887909   28.242462191    9.132668168    8.409558157    7.5420
45077
##  [6406]    6.807520905    3.668172845    3.411841770    7.252422712    7.0941
08622
##  [6411]    6.927023416    6.744850896    6.656910111    6.502831171    6.3677
41629
##  [6416]   33.339057862   62.438856227   75.507670467   86.348294325   87.7718
54457
##  [6421]   78.449365459   75.223436267   69.832664318   56.776835639   37.2529
88106
##  [6426]   23.753694279    2.819818046    2.058373110    1.360417853    0.9565
35394
##  [6431]    0.093760794   -1.611671651    0.272810030   -1.104679422   -1.1657
49887
##  [6436]   -1.079529744    1.031932258    1.637068043    1.831412707   17.3307
65089
##  [6441]   31.428686928   43.779746735   51.302062194   52.084847302   63.5017
40014
##  [6446]   78.343163813   75.661127509   77.190771192   49.198991768   20.0406
41277
##  [6451]    2.996768293    2.437091203    1.752151456    0.978066434   -5.6371
61731
##  [6456]   -6.687816049   -3.588480836   -4.399487752   -5.642468382   -4.6425
48342
##  [6461]   -0.989566652   -3.750773126   -2.377630628   24.111193265   51.5595
34976
##  [6466]   71.531001733   69.525200347   69.290702649   71.771726668   76.1545
28651
##  [6471]   76.181180543   65.186596517   43.243713029   23.458945834    1.1836
06397
##  [6476]    1.167407637    0.336136945   -0.415913974   -4.129587612   -4.7499
13298
```

```
##  [6481]   -1.144321278   -1.539190565   -1.940752098   -2.705049266   -7.5828
63244
##  [6486]   -8.501503609  -10.096831389   10.390022733   30.605710345   56.5211
71539
##  [6491]   58.109367078   57.174659063   56.601991277   55.004328998   42.4312
00665
##  [6496]   38.697197129   25.341212446   14.619514973   -5.720180922   -4.7802
99200
##  [6501]   -4.754430813   -5.064528109   -6.388145740   -7.669235581   -4.0365
04577
##  [6506]   -4.178915817   -3.819069997   -3.698915216   -2.823754302   -2.8730
91544
##  [6511]   -2.931965625   23.279494865   22.456372132   27.008584443   41.9031
40847
##  [6516]   57.110179457   58.999365096   64.655710435   56.362063254   45.9192
29713
##  [6521]   25.441737427   15.882892340   -0.316229782   -0.440882831   -0.7530
84969
##  [6526]   -0.914112900   -1.808304228   -1.727983769    2.414072338    2.4707
03484
##  [6531]    2.518696278    2.584764698    2.614679907    2.671542989    2.6817
83612
##  [6536]    6.179426256    8.189838066   12.538813477   23.811005233   21.3123
82614
##  [6541]   38.645773940   49.586974829   43.732034198   47.363342664   33.3440
77040
##  [6546]   16.715340745    5.885339565    5.323226383    4.728819227    4.1588
17093
##  [6551]    1.505558868    1.456872974    5.514122715    5.533412467    5.5581
78701
##  [6556]    5.598384318    5.526725877    5.502786700    5.440315434   17.6664
23944
##  [6561]   31.527761825   44.461955583   62.811749847   74.289004765   85.5948
29252
##  [6566]   81.102084781   59.052745827   71.846324827   46.879014477   26.2588
23980
##  [6571]    6.495076286    6.077726007    5.349761415    4.781179167    2.1706
62026
##  [6576]    2.075879300    6.066952432    6.029903849    6.020670242    5.9854
04492
##  [6581]    5.715588164    5.555165638    5.389794216   25.389878156   46.2981
36170
##  [6586]   71.719211949   87.369889716   85.954787173   85.328570062   83.9792
04328
##  [6591]   71.868157242   53.026813433   37.050029388   30.717300776    7.2322
04006
##  [6596]    6.916338103    6.105749564    5.545877466    2.720942958    2.5896
81473
```

```
##  [6601]    6.549273645    6.526842051    6.548807448    6.624202762    6.6024
18072
##  [6606]    6.645269712    6.625627495   32.283241272   36.926831808   47.2629
48963
##  [6611]   58.575020058   69.249298187   77.266834922   85.830682769   83.8612
46684
##  [6616]   78.310944271   51.379095612   26.684712701    8.377929419    8.0979
27074
##  [6621]    7.467933912    7.004132739    4.486080677    4.374705317    8.2669
47232
##  [6626]    8.084009882    7.898808782    7.689358649    7.371496392    7.1698
36510
##  [6631]    6.966354117   21.373709692   38.075187611   51.264953826   60.0481
92189
##  [6636]   56.013660298   56.744835219   61.219951612   53.012806730   45.4501
61893
##  [6641]   27.172567730   21.615374244    6.119220442    5.986457335    5.2820
74190
##  [6646]    4.852907753    2.414860297    2.434088571    6.523442704    6.4956
58424
##  [6651]    6.513259796    6.607783109    6.556945240    6.570395797    6.5354
81025
##  [6656]   18.030514156   34.508984040   44.437820384   63.463424078   74.6229
53772
##  [6661]   85.232326768   82.536649313   64.496430799   72.443024638   48.4578
96943
##  [6666]   24.761601954    7.048978093    6.661870456    5.959642152    5.5296
92211
##  [6671]    3.311070470    3.389124105    7.523080341    7.512740989    7.5496
83855
##  [6676]    7.531421800    7.488251231    7.382003892    7.329601995   25.3938
83786
##  [6681]   46.616788290   71.717353217   81.136725433   82.868547601   83.2627
07191
##  [6686]   86.349499555   85.553585323   67.019622831   48.104906334   26.5275
93677
##  [6691]    5.920788386    5.802252735    5.221610368    5.115182932    4.3249
17169
##  [6696]    4.355105514    8.462053447    8.563860572    8.637236107    8.6650
71042
##  [6701]    8.723774052    8.790819771    8.964352060   31.451153191   61.5694
52112
##  [6706]   83.718549420   94.558995054   93.390779039   93.109787771   94.1014
06722
##  [6711]   94.693585740   88.082773027   60.719550078   27.711091952   13.4800
96289
##  [6716]   12.641335980   11.861447588   11.332474867    8.975884974    8.8643
99233
```

```
##  [6721]  12.821106459  12.654657512  12.472556249  12.325307121  12.0875
67243
##  [6726]  11.919253031  11.788634543  33.463913399  64.734032226  86.4739
09186
##  [6731]  94.888396957  93.572421369  88.765665054  93.411021927  89.9351
67277
##  [6736]  78.783537813  53.229751859  31.633311820  11.757428624  11.4558
43241
##  [6741]  10.687312629  10.150274522   7.585801251   7.526549142  11.5524
42275
##  [6746]  11.561375395  11.576452020  11.564399698  11.460741657  11.3404
47668
##  [6751]  11.308639999  27.678795843  54.041712056  64.381160706  85.8692
19057
##  [6756]  66.487060945  60.153061236  80.473305002  62.196813829  53.2135
20183
##  [6761]  42.400585834  29.464510445   8.390128332   8.801752158   8.3885
76336
##  [6766]   8.120945476   6.278466638   6.155655446  10.140833221  10.0185
82588
##  [6771]  10.024957426   9.953720103   9.842602386   9.737378915   9.6388
35198
##  [6776]  31.294893450  61.591369142  83.880702109  91.656244968  90.6550
49811
##  [6781]  91.296526992  92.738116215  94.339086882  86.515645896  59.7151
75045
##  [6786]  27.077856001   7.832239710   7.771854637   7.233472603   6.7908
94322
##  [6791]   4.701832689   4.651412308   8.620770939   8.475185045   8.4196
85267
##  [6796]   8.317338082   8.208474897   8.109870541   7.983763625  28.9034
64750
##  [6801]  59.181416898  80.186751514  88.572725178  87.063621529  87.2911
47975
##  [6806]  88.908248336  90.282203141  83.253654539  55.097920872  21.9865
66980
##  [6811]   7.747078497   8.009923717   7.738547397   7.461778017   5.2769
57876
##  [6816]   5.266978720   9.255904071   9.174987475   9.104996455   9.0502
04220
##  [6821]   9.009785580   8.979921139   8.981949275  28.054779995  60.7387
81182
##  [6826]  78.592278282  77.705705951  89.505258646  90.868619654  90.5279
86748
##  [6831]  89.330513798  84.173514471  41.696070246  30.285740267   9.8276
07579
##  [6836]   9.777633451   9.105251268   8.554003898   6.117581395   5.9852
85422
```

```
##   [6841]    9.954369081    9.841137956    9.751447481    9.666697241    9.5971
27061
##   [6846]    9.475875707    9.370315791   15.047487272   25.862582230   29.1864
41869
##   [6851]   45.281968694   58.429263814   56.909434532   75.928520451   62.3252
91411
##   [6856]   49.579398135   36.937365248   24.631327361    8.516424538    8.0020
77188
##   [6861]    7.355701282    6.913376975    4.828972093    4.794192291    8.8355
06643
##   [6866]    8.769628994    8.671166313    8.526234307    8.025293263    7.6982
29668
##   [6871]    7.401312678   21.511183367   52.548817074   68.544195802   74.7729
61656
##   [6876]   81.655766014   79.879993865   78.791904391   78.134204057   69.1695
01152
##   [6881]   38.201103629   11.625313756   -3.265846695   -2.700885175   -2.2486
61655
##   [6886]   -1.921203560   -1.210381551   -1.588045171    1.529354233    1.4629
58746
##   [6891]    1.609038573    1.307266751    0.537816138    1.398987193    1.7021
83034
##   [6896]   19.113946638   50.162321770   72.560994676   86.153347530   84.4179
34747
##   [6901]   84.337756427   83.945449547   86.082100483   77.914141810   48.0229
58623
##   [6906]   18.364017602    2.383704187    2.376230233    1.592067097    0.7417
25960
##   [6911]   -3.756665437   -4.572407653   -0.636312134   -0.601048163   -0.6303
53670
##   [6916]   -0.772840604    0.933168256    0.642636264    0.236534453   10.4181
81253
##   [6921]   42.637726520   67.947766626   57.178126242   69.758734312   71.2477
99433
##   [6926]   65.363536687   70.548904232   64.312350542   32.214639732   17.9114
49733
##   [6931]   -1.478313870   -1.093050053   -1.377624241   -1.627647247   -5.4000
25570
##   [6936]   -5.913234636   -1.783824778   -1.074386543   -0.738460714   -1.0641
55573
##   [6941]   -4.629928345   -2.831457271   -1.455611950    2.282537955   11.0522
13356
##   [6946]   32.117007984   46.596333773   69.720986920   77.755178148   59.6232
48664
##   [6951]   65.053584150   47.056916670   34.118215966   13.110190469    5.7488
73736
##   [6956]    4.305010160    2.750917179    1.287550101    0.301334504    1.0951
72988
```

```
##    [6961]     5.109611646     3.713842270     1.260400179    -0.741089088    -4.4846
64854
##    [6966]    -4.016900575    -1.940572520     5.102410956    23.582511489    33.8680
45022
##    [6971]    47.498894296    55.225064911    56.001980920    66.367349763    58.3920
52300
##    [6976]    46.517203500    23.787434765     8.921039991    -1.229775903    -0.9137
07408
##    [6981]    -0.877138454    -0.734946022     0.008523427     0.003099894     4.0501
22472
##    [6986]     4.069631110     4.119618018     4.158272230     4.437696145     4.4454
73860
##    [6991]     4.330634813    12.197450175    28.842778802    46.864319420    68.0801
48456
##    [6996]    80.570356427    81.631728405    82.199767380    80.100488285    67.9142
05841
##    [7001]    35.765136805    11.525093922     0.730683955     0.228975445    -0.4693
51839
##    [7006]    -1.241158563    -5.225024947    -5.331129443    -1.319861912    -1.2937
11984
##    [7011]    -1.595578247    -1.530077019    -1.358011935    -1.020396873    -1.3488
74106
##    [7016]     2.828646484    22.659724768    63.867893051    60.989536842    74.8487
93404
##    [7021]    74.426258373    67.252633144    74.596815922    63.587008524    36.0272
75587
##    [7026]     7.070565368    -8.690259069    -7.837748733    -8.189286088    -8.0565
28075
##    [7031]    -9.232670845    -9.936574295    -5.548756410    -6.087951089    -6.3684
86835
##    [7036]    -6.629531049    -5.017139919    -5.067757616    -4.284134117    -0.3897
33969
##    [7041]    10.383284184    41.259153640    62.450889821    50.202775017    43.0268
45987
##    [7046]    41.245549503    35.405945314    30.433381003    16.128946038    -5.9546
47336
##    [7051]   -12.752897286   -12.006082504   -12.181845095   -11.858064344    -8.9282
77362
##    [7056]    -6.659169755    -1.281467909    -0.473518269     0.087576794     0.5666
52366
##    [7061]     4.062393354     4.054326262     4.031234789     8.546667866    22.0699
78554
##    [7066]    18.140019379    50.443651126    48.683953900    48.753818073    44.8995
83618
##    [7071]    42.132959136    31.954764183    20.667016451     7.930960520    -2.2985
92001
##    [7076]    -2.598936038    -2.675325817    -2.706013694    -3.051101439    -2.9841
77421
```

```
##  [7081]    0.374692563   -0.566748479   -1.227142532   -1.692560265   -3.8314
71140
##  [7086]   -5.342396528   -6.223659963   -3.700274603   14.995281077   27.8818
28885
##  [7091]   40.083046339   55.899504663   37.836838990   43.281989943   35.6506
35230
##  [7096]   25.124762389   29.476293586    6.943712998   -3.059306805   -2.8157
01470
##  [7101]   -3.022546292   -3.065201254   -3.833707744   -4.252665342    0.0469
67179
##  [7106]    0.563802313    1.032591974    1.345937320    2.667823298    2.9480
92862
##  [7111]    2.838021205    7.240042755   16.998328796   54.092809772   63.6991
24775
##  [7116]   61.569860606   65.160291769   80.200193555   79.145276341   42.9756
72434
##  [7121]   31.279333366    9.522653531    2.087471642    1.568990146    1.3089
71037
##  [7126]    1.200885494    0.352354506    0.502613683    4.662258073    4.8834
53015
##  [7131]    4.995507608    4.954959313    4.781478518    4.482126143    4.2348
95619
##  [7136]    9.991394757   31.855391325   55.073465186   77.160181472   68.3703
35905
##  [7141]   60.210883365   70.289837274   59.197725917   58.292492419   56.1575
34548
##  [7146]   23.527009978    1.920536419    2.294433202    1.957187351    1.7481
10690
##  [7151]    0.209202868    0.214134677    4.285602927    4.287234541    4.2129
15827
##  [7156]    4.085621846    3.995308222    3.972394876    3.900641427    6.5151
60892
##  [7161]   16.053009670   11.221106907   46.489007464   42.594918298   50.9535
25010
##  [7166]   40.472984488   37.464657409   34.621478037   41.327392409   20.1026
57723
##  [7171]    2.594581466    2.223283601    1.265726098    0.690633413   -1.4373
51911
##  [7176]   -1.724173222    3.056845243    3.559223716    3.551598609    3.6541
72913
##  [7181]    4.504248003    4.196080438    2.602410341    4.355375233   31.7832
80642
##  [7186]   51.384540076   56.589038910   61.080201549   51.835662027   55.1546
95906
##  [7191]   51.639666476   38.185296986   45.222781827   24.107825089    9.8753
87098
##  [7196]    9.658901756    9.128304843    8.704419877    6.863161156    6.7741
34463
```

```
##  [7201]   10.908484904   11.034205014   11.057150409   11.000319906   10.7281
71045
##  [7206]   10.641384848   10.523713850   13.006379484   23.579869178   42.1560
98819
##  [7211]   62.919914342   65.632284961   69.609429295   74.523372026   67.5600
34404
##  [7216]   51.574659941   50.094346921   19.371009608   10.710691640   10.2028
23964
##  [7221]    9.409319133    8.695385900    6.046471489    5.694579491    9.3146
07802
##  [7226]    8.919431894    8.248329337    7.485996559    4.714513965    4.7166
68711
##  [7231]    4.908097623    9.048834094   28.784102955   63.898773915   78.9725
40395
##  [7236]   77.704325626   76.052673843   72.418648893   66.353938065   61.4646
46519
##  [7241]   57.292163270   14.796252783   -1.810289203   -2.119402030   -3.0586
94561
##  [7246]   -4.252234615  -10.982144137  -11.548731470   -7.284808331   -6.8088
99401
##  [7251]   -6.536274341   -6.387053842   -0.944329841    0.565839464    1.4616
77641
##  [7256]    2.748436423    8.775842310   20.777365677   41.799564789   33.5765
26010
##  [7261]   51.864717155   63.706229985   57.751668995   57.002449075   62.3664
01313
##  [7266]   31.525808953    5.703684883    6.020019245    5.732125140    5.9265
84633
##  [7271]    4.433459116    4.430193248    8.303409438    8.196045730    8.0618
03172
##  [7276]    7.865753902    7.744958875    7.539170256    7.260489789   17.1125
98302
##  [7281]   43.119472393   67.786041890   76.218414021   73.758130771   79.5917
11469
##  [7286]   81.119629638   80.152418228   71.190732312   56.994622766   28.3701
07105
##  [7291]    6.503553464    6.740613570    6.125519599    5.667228259    3.8135
94075
##  [7296]    3.712107846    7.697318032    7.488923069    7.101423919    6.6631
87746
##  [7301]    4.893804810    4.575121947    4.630205876    6.937095493   30.6113
06843
##  [7306]   46.620086750   53.747485019   72.052825043   64.947394483   53.0243
86899
##  [7311]   41.410219411   44.048751298   38.627054565   15.574373319    0.8574
80600
##  [7316]   -0.406344924   -2.640265802   -4.746725483  -16.118763085  -16.4181
05676
```

```
##  [7321]  -12.536041890  -12.862834503  -13.154529499  -13.345059867  -13.5301
09758
##  [7326]  -13.378477244  -12.580185091  -11.043134615   -4.948953542   21.5095
50504
##  [7331]   43.264590164   55.538425530   69.032357712   66.295926415   65.3009
22180
##  [7336]   59.667645573   54.431616540   19.042647699   -4.080154590   -6.1533
46948
##  [7341]   -9.195268106  -10.670160485  -16.649512365  -16.269577140  -12.7177
63150
##  [7346]  -13.525858477  -13.249806747  -11.313916486   -0.668350686   -2.5508
68809
##  [7351]   -4.594070199   -4.691566213    0.767523202   25.261223288   47.3052
92866
##  [7356]   40.914291503   45.166074601   37.705868738   27.151807615   39.0057
86065
##  [7361]   40.934764099    5.780441661  -14.140287590  -14.227296637  -14.6165
33525
##  [7366]  -14.463710174   -5.239258626   -3.957741805    1.298441632    2.1790
82031
##  [7371]    2.886258689    3.464475534    5.938430337    6.083519213    6.0710
16876
##  [7376]   12.702821735   26.371333979   39.269931223   49.835451839   52.8369
49000
##  [7381]   57.930175074   53.162999401   52.744243344   50.958688468   45.2106
21147
##  [7386]   29.719528633    4.398439653    3.843740385    2.767411566    2.0455
24755
##  [7391]    0.063334044    0.079195904    3.889898133    3.562441912    3.0793
91514
##  [7396]    2.579258630   -0.286280948   -0.897663753   -1.466110627   -0.0989
91783
##  [7401]   20.601511969   33.571214052   44.296389668   55.150677615   43.0956
61344
##  [7406]   41.008112572   31.127026351   49.921650403   26.096027743    8.4727
88919
##  [7411]    1.254783552    0.124123582   -0.681006105   -1.207436085   -3.3029
31405
##  [7416]   -2.698731046    1.902501004    2.589839535    3.368475302    4.0586
69104
##  [7421]    5.607123981    5.800191766    5.919270952    6.013255806    7.2930
13745
##  [7426]   11.194842127   17.956407587   38.607606696   54.285096105   42.9659
22701
##  [7431]   39.793527760   32.060669728   37.463791500   25.891221098    6.4664
50630
##  [7436]    5.914551548    5.365900230    4.956093341    2.961020262    3.0037
41963
```

```
##   [7441]    7.086722889    7.121568831    7.141632637    7.138191281     6.9390
89959
##   [7446]    6.857023747    6.797058786   13.904495245   28.614412008    54.6729
56105
##   [7451]   79.150110832   81.683933465   79.715152418   65.282603940    56.9147
02583
##   [7456]   64.823773839   63.652012078   32.683308058    5.222775146     6.4733
38552
##   [7461]    6.195303295    6.058990885    4.650209345    4.654196643     8.6852
36516
##   [7466]    8.629930112    8.446886857    8.228561410    7.833188149     7.5722
38480
##   [7471]    7.282301301    7.087230356   11.855620104   12.381496611    18.7083
96217
##   [7476]   21.832571329   28.633496161   39.274812799   33.726037638    29.0901
69700
##   [7481]   25.496602106   34.618094491    4.325724818    4.983932271     4.6242
32300
##   [7486]    4.467941665    2.551899322    1.901517456    3.040301854     0.3907
86865
##   [7491]   -1.791705853   -3.139623520  -10.072393081   -9.350398596   -10.8971
93573
##   [7496]   -8.485812134    8.133853939   23.298898925   41.244576694    42.9501
49530
##   [7501]   35.320982859   35.737592194   29.087487272   51.669236433    36.2248
15274
##   [7506]   13.135121129   -7.893323567   -6.539045539   -7.781176203    -9.5187
07978
##   [7511]  -17.028343398  -16.859788793  -11.659149380  -11.476568581   -11.3404
93493
##   [7516]  -11.220273701  -11.837157380  -11.169699875  -10.277535145    -7.2579
01438
##   [7521]    7.510398859   21.517562672   26.455656761   33.550604134    31.9958
28226
##   [7526]   24.506138713   15.981162345   22.185072256   19.695623986    14.9353
56037
##   [7531]  -16.702683948  -14.738190842  -15.206225987  -15.638009877   -16.0253
18713
##   [7536]  -14.081058815   -8.435562212   -7.593345343   -7.126431206    -6.1608
28167
##   [7541]    4.025123754    4.494784711    4.262682384    9.314174983    24.8194
15854
##   [7546]   54.530159585   58.550640189   79.706339790   76.881504779    78.2514
61316
##   [7551]   69.847491114   67.758994440   38.584903609   26.410405557    -1.1416
04718
##   [7556]   -0.338162073   -0.514900237   -0.617495822   -0.163911905     0.1423
30004
```

```
##  [7561]    4.247995689    3.892121371    3.690586403    3.481440259    1.1048
11315
##  [7566]   -0.588008766   -2.015202815   -4.106614003   -2.023030041   -2.0275
52691
##  [7571]    0.196438742    5.042536692    7.265496089   21.012693865    8.8313
41977
##  [7576]    6.024721058   -0.808884183    5.426495596  -14.227390098  -13.8324
16414
##  [7581]  -13.889884777  -13.752856975  -13.470496777  -12.814405826   -8.4275
91395
##  [7586]   -7.905016577   -7.044629253   -6.184164817    2.624652968    3.3951
98759
##  [7591]    3.819688251    6.917238836   19.499865887   33.759302241   46.4539
05703
##  [7596]   54.888975253   45.082671416   45.527464811   41.326368727   38.1478
72326
##  [7601]   25.778334644   13.675986910   -5.117849881   -5.026937237   -4.1676
84580
##  [7606]   -4.065943335   -6.702899293  -10.500417492   -8.555370201   -9.7486
85891
##  [7611]  -10.603069506  -11.135103525  -12.717205959  -12.665777837  -12.4513
68398
##  [7616]   -7.627370976   17.627278608   41.187578856   56.936724274   61.9381
92329
##  [7621]   45.317435942   40.302172557   25.024443038   23.145635234   28.1770
93362
##  [7626]   31.367096338  -14.125626571  -12.894039403  -13.542561737  -13.6122
91853
##  [7631]  -11.774163405  -10.408516753   -6.923879481   -7.731650346   -8.5119
16118
##  [7636]   -8.787550857  -10.794225754  -10.170415316  -10.945149990  -10.5779
36808
##  [7641]   -2.722665648   11.589703389    7.271525665   25.438832229   31.9123
68727
##  [7646]   34.557160926   24.150273634   23.954481284   14.993796620    9.6462
32197
##  [7651]    0.478843147    1.068275694    1.482761006    1.472525866    1.6423
24206
##  [7656]    1.696248358    5.497274191    5.659530313    6.377930344    6.8557
23808
##  [7661]    8.768177319    8.611512787    8.113562840    7.916153627   14.1090
11170
##  [7666]   18.030596719   48.484972434   40.145574857   45.489283890   41.6140
17920
##  [7671]   27.743863787   27.485496529   50.848185336   37.738180966    8.8524
49714
##  [7676]   10.374594967    9.931709792    9.611165394    7.481945431    7.0669
78625
```

```
##  [7681]  10.644400408  10.187688176  10.026742186   9.780829685   9.1553
10522
##  [7686]   9.413293325   9.537633213   9.751517274  11.538143130  12.3756
76576
##  [7691]  22.236863768  35.759789360  31.803300711  37.271716994  39.7269
07164
##  [7696]  29.757497773  40.485063766  29.013179221  13.607391612  13.3710
03133
##  [7701]  12.753494157  12.245399708   9.888729584   9.133420445  12.5643
38171
##  [7706]  12.025829216  11.500175512  10.509425600   6.733375886   6.2926
29237
##  [7711]   6.112644718   8.730809615  21.617110933  34.513920059  51.9903
02512
##  [7716]  58.649474861  62.616193234  45.192172278  56.395891849  56.6674
48912
##  [7721]  73.883308021  74.642826453  10.005098670  12.573421842  11.7758
48093
##  [7726]  10.951695374   9.417348467   9.889215933  14.170768107  14.3251
24290
##  [7731]  14.395231210  14.466198082  14.782816455  14.746257734  14.7297
92843
##  [7736]  14.707744252  44.727734976  53.672462719  63.294836597  64.7829
39463
##  [7741]  70.776082290  68.583149531  67.401103927  65.773981382  36.7729
65628
##  [7746]  22.741373368  14.139407253  13.843374926  13.240227243  12.7042
48509
##  [7751]  10.262965143   9.914255448  13.663754126  13.385535241  13.0947
98471
##  [7756]  12.696938834  12.456248055  11.939855367  11.292373134  10.4680
63629
##  [7761]  36.972953378  49.961961776  77.797113874  68.790841735  72.5909
80149
##  [7766]  67.915354251  62.740966122  60.800982103  61.297882828  39.6455
99541
##  [7771]   0.921280715   0.436040890  -1.215765398  -2.242306003  -7.0716
91995
##  [7776]  -7.526260267  -3.632926088  -3.663925846  -4.305653316  -4.7718
51549
##  [7781]  -6.844883323  -7.016459027  -6.427232858  -6.199635892  -0.9511
47000
##  [7786]   4.909458761  25.281191260  46.397573537  47.508338282  47.0595
34103
##  [7791]  50.854965105  44.970177970  52.761776240  30.584685954 -10.5287
40386
##  [7796]  -8.710344441  -9.004962463  -9.068995865  -8.094209860  -7.4219
86340
```

```
##   [7801]  -2.983562199  -2.711816841  -2.743932843  -2.865839388  -2.4765
54567
##   [7806]  -2.651913933  -2.702294978   0.393734906  22.360277375  37.1846
69245
##   [7811]  49.764467352  49.245459836  59.842748784  46.548029859  63.7393
20230
##   [7816]  70.700708796  79.676465268  70.434401362  -5.438091588  -2.7509
60479
##   [7821]  -2.929817435  -2.992856946  -3.427232336  -3.302861567   0.8537
08693
##   [7826]   1.068240903   0.851769743   0.041238217  -3.308849802  -4.1799
02930
##   [7831]  -4.437300223  -4.898210117  27.975487630  60.835975176  72.4433
49244
##   [7836]  75.260153428  73.634285612  63.124125065  50.358680653  57.5339
59447
##   [7841]  50.685632588  21.373586317  -7.496881719  -6.703436870  -7.5067
00964
##   [7846]  -8.173040956  -8.660101267  -7.137242578  -1.974642646  -1.2197
17908
##   [7851]  -0.753663337  -0.485212194   2.812591691   2.951426164   2.9775
99538
##   [7856]   2.945899083  22.775674712  34.533959298  45.726704962  51.5628
06803
##   [7861]  55.541753442  53.658648153  51.505372755  52.814091811  38.9734
14382
##   [7866]  21.528765868   4.600141334   3.987804843   3.578415467   3.3887
83676
##   [7871]   2.318566043   2.152734837   5.457198204   4.694718910   3.7699
44469
##   [7876]   2.794504649  -2.816127921  -3.515117824  -4.381326690  -5.5002
39249
##   [7881]   2.438800438   7.537863257  20.754494905  37.241298628  43.6631
41713
##   [7886]  34.163029927  31.880062076  29.446275726  34.323350290  22.9396
65040
##   [7891] -14.759870757 -13.960712950 -14.237082901 -14.484056381 -14.6353
66754
##   [7896] -14.428039619 -10.180962402 -10.290096285 -10.375057169 -10.6413
15222
##   [7901]  -8.963262197  -7.330280881  -6.202459779  -2.578246733  16.7528
94688
##   [7906]  28.427921270  38.522766296  44.265030178  45.031240173  46.6910
97621
##   [7911]  50.745641109  43.191992594  53.484573053  36.525762882  -3.6701
43825
##   [7916]  -4.454433196  -5.114146118  -5.189487053  -3.171527652  -2.3432
79094
```

```
##  [7921]   3.095754973   3.508945377   3.356144765   3.713793197   5.5109
27228
##  [7926]   5.504899669   5.465268072   5.389620781  21.147015857  49.1483
07023
##  [7931]  58.646635964  75.476115522  86.375715026  66.358680528  42.5064
85325
##  [7936]  60.621981635  54.819011785  32.151540545   1.909321665   2.3997
83320
##  [7941]   2.254856386   2.051009286   1.942054210   1.368861816   5.6069
58200
##  [7946]   5.264736480   4.778275904   4.380416212   3.290244524   3.6838
99705
##  [7951]   3.635717361   2.995063816   2.725479960   3.279117301   8.2597
91426
##  [7956]  12.906618415  14.927873780  11.775095071   6.472637870   7.3241
75199
##  [7961]  11.053919632   6.761957517   4.257529806   3.857765553   3.5630
99094
##  [7966]   2.887651714   0.610729797   0.634316755   4.837551688   5.4642
22718
##  [7971]   5.884439174   6.296551933   7.727879706   7.882686318   7.9580
75892
##  [7976]   7.966366321  15.665646941  18.179953239  28.608829464  38.5731
96972
##  [7981]  46.748991635  38.102241548  45.320356269  26.409175898  33.2058
35856
##  [7986]  38.333073989  10.910177851  11.572955427  11.274227151  11.0620
05889
##  [7991]   8.992474818   8.939645097  12.896360428  12.606821452  12.0759
85919
##  [7996]  11.669167042  11.360946608  11.040796010  10.695725866   9.9805
33065
##  [8001]  27.632225243  40.995876468  49.587354490  59.644123865  60.6450
70471
##  [8006]  63.209449358  65.607566987  61.371930012  67.904125772  58.1252
33680
##  [8011]   4.558204399   7.610466593   7.366129205   7.033051251   5.2889
83825
##  [8016]   5.258201982   9.381920905   9.394886075   9.336558635   9.2744
66290
##  [8021]   9.127981991   8.881247473   8.588684054   8.130738303  25.1043
88210
##  [8026]  35.791874625  50.534856235  50.627226516  65.656475735  66.6334
55413
##  [8031]  44.368460083  49.873604945  49.498154118  46.978957009  -8.0471
90551
##  [8036]  -6.188226907  -7.205155341  -7.870161850 -12.109366290 -12.4478
39774
```

```
##   [8041]  -9.174884198  -9.539841835 -10.041911777 -10.649975705  -9.3779
29698
##   [8046] -10.133564288 -10.331173466  -4.248804643  21.360461629  25.6000
98720
##   [8051]  32.014500348  28.341487712  34.861929515  34.428759787  28.1456
53773
##   [8056]  35.453296807  32.256790495  30.791103982 -15.429827500 -12.0812
43624
##   [8061] -12.002722940 -12.002811628 -11.885341333 -11.317107329  -5.9583
85980
##   [8066]  -5.052006872  -4.411646220  -3.888351015  -2.520367736  -1.9613
67241
##   [8071]  -1.293209645  -0.738554119   1.701213841  40.269920562  37.1527
17607
##   [8076]  52.981984289  58.890792597  55.793792013  63.494670787  48.5586
74742
##   [8081]  37.182252067  43.692046082  -8.420726602  -6.666878946  -7.3701
44279
##   [8086]  -7.907737836  -7.577826996  -6.255846555  -0.201133017   0.7176
78730
##   [8091]   1.100465938   1.046987208   2.374080849   2.406905749   2.4431
35692
##   [8096]   2.481224254  42.717747804  66.708893866  55.783022183  67.8232
40987
##   [8101]  72.663953896  68.313302217  59.533918499  56.211494460  57.2376
50493
##   [8106]  80.958870244   3.866943995   5.282126295   4.300573389   3.5821
37696
##   [8111]   0.837075135   0.508912756   4.190033407   4.075676586   4.2458
35254
##   [8116]   4.177911628   4.105786470   4.237280542   4.614077683   4.6463
57658
##   [8121]  27.316766453  25.834305320  56.507097411  42.195640467  40.6456
62298
##   [8126]  54.462075394  46.973569458  36.117439118  48.143807468  51.8271
02542
##   [8131]   0.553221341  -1.266752788  -4.605841892  -6.371272615 -12.5099
57144
##   [8136] -15.110247875 -11.632348405 -11.510789464 -10.116212964  -9.0507
63592
##   [8141]  -2.252829024  -4.280518143  -7.516102506  -4.506062866  20.0368
62484
##   [8146]  27.282253069  42.913052098  46.129911471  63.751833317  69.5016
66467
##   [8151]  47.671286405  76.618144046  49.436635585  39.194152743 -14.2006
86540
##   [8156] -14.217079386 -14.945954906 -15.311108714 -16.730542163 -17.0570
07576
```

```
##  [8161] -13.062131608 -13.232465391 -12.952705582 -12.886667116 -12.9791
32219
##  [8166] -12.741391593 -12.643326348 -12.695694819   5.026344474  37.9803
00096
##  [8171]  46.211283034  60.881366698  50.876766324  38.662463771  42.7348
94388
##  [8176]  33.125068371  39.608570743  44.962347649 -18.122851187 -15.5825
99670
##  [8181] -15.587670489 -15.744936832 -16.563473682 -16.753655278 -12.9085
28782
##  [8186] -13.137189068 -13.251696956 -13.451294284 -13.635062156 -13.8362
51739
##  [8191] -13.946945541 -14.000511310  16.261877963  26.035847173  14.8722
97079
##  [8196]  37.843615223  46.773677933  25.717565588   6.855870823   5.5292
02169
##  [8201]   5.454342532  15.921662287 -14.792777621 -13.521679930 -12.1966
11272
##  [8206] -10.883223784  -3.386970552  -4.399427160  14.098932098  14.0490
99662
##  [8211]  14.032449143  13.994638810  13.975966256  13.895584517  13.7927
96378
##  [8216]  13.614452760  27.153980244  44.782876228  68.380860321  57.2144
21935
##  [8221]  55.103212327  56.900554831  45.316181799  36.006052728  32.0775
06835
##  [8226]  31.940932289  11.104094763   9.983116724   9.256200203   9.1040
85252
##  [8231]   7.150456798   6.028276776   9.807728715   9.503760088   9.4484
37324
##  [8236]   9.727061145  10.175602866   9.470102642   8.628106842   8.2998
58242
##  [8241]  13.596593470  17.032372867  30.394800532  39.153815045  52.6202
57027
##  [8246]  59.091377701  46.214576730  57.310463532  37.511431457  28.6995
44838
##  [8251]  12.390914091  11.342442531  10.647411085  10.277994321   8.6021
24549
##  [8256]   8.521131027  12.522612966  12.427711928  12.318090733  12.2262
10981
##  [8261]  12.217072214  12.154844506  12.100983644  12.018466246  27.1968
03493
##  [8266]  30.753363358  47.878554224  64.032488488  49.845025777  41.7308
43847
##  [8271]  44.936099075  37.314221180  48.106801092  73.380035565  12.8779
01361
##  [8276]  14.041586458  13.292487043  12.760654596   9.992951565  10.0327
08961
```

```
##  [8281]   14.110867860   14.034782493   13.513507136   12.614712897   10.0945
82843
##  [8286]    9.081748468    8.063502109    8.121129531   53.177419727   55.2431
45290
##  [8291]   54.296021926   68.831935680   71.821650783   56.314564980   46.0003
14794
##  [8296]   48.215834149   43.609911241   32.741243196  -15.488909802  -10.4589
20972
##  [8301]  -10.118946614   -9.728884806  -11.567232768  -10.356081782   -5.5790
95789
##  [8306]   -5.294975335   -4.826116308   -4.271630909    2.829692756    4.6389
69887
##  [8311]    5.560825259    6.395303149   55.098620299   71.691717923   87.0363
70613
##  [8316]   84.217048093   82.392418697   84.230802427   73.695627535   69.5826
76468
##  [8321]   59.547155680   60.870787635   11.450181811   12.940703410   12.2628
43375
##  [8326]   11.734555859    8.792407497    9.348399313   13.657423216   13.7741
82396
##  [8331]   13.812793344   13.914147968   14.721123584   14.364841906   14.1907
58900
##  [8336]   35.073507994   57.403309145   57.707330765   62.338638037   68.0337
72368
##  [8341]   71.132427942   73.446433011   75.851754101   70.871239306   65.6252
84657
##  [8346]   62.445652310   13.366228167   15.678480863   14.726378536   13.9959
18301
##  [8351]   10.829529629   10.559491429   14.499530854   14.413996503   14.3077
54752
##  [8356]   14.260550454   14.335194353   14.215309968   14.008689012   13.7307
98276
##  [8361]   21.164154246   37.289920419   26.704777946   25.272819033   27.8553
55971
##  [8366]   18.492753354   25.678604397   23.643309452   10.720032745   29.8313
01291
##  [8371]   -0.437073085   -1.597105656   -2.723050040   -3.643815848   -5.9923
21041
##  [8376]   -6.283321233   -2.595466130   -3.937121873   -5.244464018   -6.3938
34813
##  [8381]  -11.013110088  -11.013145726  -11.266866084  -11.535927160   66.0107
17005
##  [8386]   66.192608433   61.852465924   67.430185891   66.542873226   63.8585
76181
##  [8391]   54.261673725   41.677382955   42.025388107   53.474369424  -16.4492
41517
##  [8396]  -14.413696156  -14.504511853  -14.932562248  -15.568526563  -15.7975
02057
```

```
##   [8401]  -11.906294068  -11.977864713  -11.806791761  -11.336204837   -8.7954
17934
##   [8406]  -10.576257091   -9.578889964  -10.103569503   63.631262526   72.2333
53701
##   [8411]   78.613594767   85.883847974   86.028760595   88.681178106   89.0600
63058
##   [8416]   89.717328448   84.347810759   83.864716031    5.683499875    9.6050
84763
##   [8421]    9.617365090    9.306957419    7.221750536    4.926299216    7.6624
95104
##   [8426]    6.518356876    5.980714238    5.939963753    6.668947935    8.3456
96819
##   [8431]    9.390493542   71.375679507   81.903023365   90.955440773   95.6336
15411
##   [8436]  100.647052481   79.094670099   84.435089629   87.093900551   93.2145
06333
##   [8441]   68.459684532   87.268275496   11.165690634   13.114417719   12.8887
31677
##   [8446]   12.762360665   11.934071608   11.883422393   15.743712003   13.0608
91705
##   [8451]   10.804530226    8.875953995   -2.988695123   -4.152647732   -5.1324
99643
##   [8456]   -6.292102955   -0.495878184   15.344062578    5.783593366    4.7361
08356
##   [8461]   23.696541787   14.342850724    6.940236273    4.555994929   -5.8952
31841
##   [8466]   -6.982973981  -10.465622709  -10.975209702  -11.258312912  -11.6807
27338
##   [8471]  -13.114662088  -12.852033095   -8.887829692   -8.898694486   -8.2919
76479
##   [8476]   -8.087216789   -7.216016950   -7.802785177   -8.628884935   -8.4155
66324
##   [8481]   75.391491696   67.782677333   79.214054606   91.075525700   83.1578
98576
##   [8486]   80.146036402   71.097793368   63.665097180   63.703294589   69.6643
41380
##   [8491]   -4.762552236   -2.549173240   -3.725405304   -4.999949973   -5.8986
53638
##   [8496]   -5.164389619    0.030812807    1.339733941    2.324894333    4.5500
93935
##   [8501]    6.516873982    8.674768666    9.440104358   54.158809241   60.6667
85280
##   [8506]   91.910101843   94.769631385   99.835036025   93.416141133  102.0127
51368
##   [8511]  101.186528727  101.523314607   94.875556823   96.682892169   10.9932
10071
##   [8516]   13.412499282   12.542399933   12.073178552   10.118765901   10.1190
04837
```

```
##  [8521]    14.227111603   14.232243354   14.252120300   14.400162836   14.6895
13670
##  [8526]    14.744203289   14.801067625   51.679420660   47.220443114   52.5502
65065
##  [8531]    57.033450812   63.984637517   54.504605000   57.279580468   53.5326
07309
##  [8536]    52.310356369   25.627272770   39.751140733    9.206947644    8.7444
60221
##  [8541]     8.566467480    8.523888700    8.228758213    8.455368553   12.6350
91815
##  [8546]    12.690043237   12.746286402   12.732046837   12.850991407   12.7278
13396
##  [8551]    12.713251912   12.688171051   13.418311529   14.175628356   19.9352
01628
##  [8556]    27.063723430   44.855976047   45.585196267   30.553364944   25.1868
41716
##  [8561]    15.077852593   10.644499572    5.566764905    4.526989004    4.2053
94207
##  [8566]     4.150001698    3.108004689    2.800125633    6.392352152    5.8330
62516
##  [8571]     5.043589446    3.589806779   -3.789202130   -5.023434865   -6.5312
75512
##  [8576]    -7.634089489   44.953692262   45.806957686   53.973595270   65.3378
85627
##  [8581]    62.764255492   62.780598348   63.206161052   66.449922637   70.4056
76520
##  [8586]    70.960491579  -13.480443647  -10.650237329  -11.043839233  -11.5866
34497
##  [8591]   -13.370252664  -13.665349176  -10.009717465  -10.160239128  -10.5955
90381
##  [8596]   -10.950537217  -11.441300046  -11.576802573  -11.470002385   70.8961
70115
##  [8601]    27.498514948   35.349692006   40.164411982   54.411116745   44.7794
79118
##  [8606]    48.667447609   43.270184053   42.719087127   31.130092812   63.7022
47526
##  [8611]    29.213027241  -16.888700557  -13.459509945  -13.567839401  -13.8243
66486
##  [8616]   -13.650040568   -9.153867136   -9.171185704   -9.274721278   -9.1692
80571
##  [8621]    -5.796051387   -4.368007452   -5.209332835   38.702597562   30.8765
28845
##  [8626]    33.275743177   31.123939277   34.636163058   42.503969458   43.7506
71475
##  [8631]    38.324807774   21.466526052   24.780350287   29.396187521   28.5129
90551
##  [8636]   -16.699106355  -12.806819962  -12.386546534  -10.045203617   -8.6357
76260
```

```
##    [8641]   -4.373560814   -3.911292173   -3.605722250   -4.254322145   -9.1392
## 29616
##    [8646]  -10.973784174  -11.781522314  -12.239579318   -7.351380690   -6.6664
## 86374
##    [8651]   -4.378606652    3.027509689    9.429928839   18.943143286   20.2122
## 29921
##    [8656]   -4.825223973   -4.227834592   -2.222561254  -14.756451451  -14.4013
## 28582
##    [8661]  -14.617752687  -14.514371713  -12.575795723  -11.967168780   -8.0216
## 68606
##    [8666]   -8.421873843   -8.226358489   -8.203916922   -4.295120508   -3.4098
## 20435
##    [8671]   -2.271549187   -0.463447189   20.691358299   22.742166011   44.0215
## 82349
##    [8676]   52.986707682   61.947588860   65.305794754   53.765792361   54.0797
## 43409
##    [8681]   36.321250873   35.543347458  -10.905079195  -10.731848816  -11.0855
## 88542
##    [8686]  -10.727253313   -6.755795751   -9.520759427   -7.792256343   -8.4126
## 51940
##    [8691]   -8.788402751   -9.417221826   -9.775132086  -10.416865364  -10.0472
## 36323
##    [8696]   51.413106004   14.402571918    2.816317297   20.668806177   20.9391
## 36036
##    [8701]   23.867321797   23.107166312   48.996071770   47.323612146   38.0728
## 20084
##    [8706]   70.416524325   44.735156513    8.153113827    7.793122521    7.5192
## 69084
##    [8711]    5.640355368    5.560521567    9.660389081    9.778026921    9.8154
## 21535
##    [8716]    9.812889845   10.640074325   11.022271494   11.050633958   49.1721
## 73576
##    [8721]   48.593875963   52.004363726   63.371243022   69.353039134   68.0230
## 19696
##    [8726]   63.032634253   61.554893528   53.031206730   53.507605421   55.8899
## 24429
##    [8731]   53.493935291   14.305072132   13.800820594   13.496414764    9.6385
## 95236
##    [8736]    9.561818281   13.568618623   13.459237633   13.286330811   13.0800
## 41994
##    [8741]   12.939419802   12.668581842   12.409563108   34.965370017   23.4567
## 26343
##    [8746]   32.555352183   45.095654658   47.370550418   51.986557618   69.2079
## 88983
##    [8751]   57.769102499   30.787289709   19.339149722   14.952243388    6.2482
## 90650
##    [8756]    6.899872693    7.529647730    7.478113810    7.104159111    7.2708
## 44346
```

```
##    [8761]   11.583620741   11.775916974   11.935468730   12.006417274   12.2667
75103
##    [8766]   12.260518661   12.166186397   12.012734803   20.050228333   17.9863
75805
##    [8771]   36.731928480   55.133978545   69.993836530   75.273635293   65.4642
69816
##    [8776]   42.930913826   48.429708135   43.360400401   48.295574178    1.1088
81493
##    [8781]    4.328595688    3.877030724    0.938972291   -0.659026048    1.9654
58597
##    [8786]    0.339453407   -1.444601434   -3.457548389  -11.166131838  -11.8683
45429
##    [8791]  -12.400417851   51.702012103   33.925509599   31.422176490   43.0239
41836
##    [8796]   33.383457648   35.302979462   33.992379819   56.371495570   56.0147
72720
##    [8801]   46.711653334   52.675799767   28.308677968  -16.524888585  -12.7090
46903
##    [8806]  -12.344292509   -6.761850896   -5.511557842   -1.079219424   -1.4637
05966
##    [8811]   -2.571976998   -3.817667026  -10.347802051  -12.252630896  -12.3118
34358
##    [8816]   32.976492031   29.132365967   30.376156851   32.728467863   31.9978
43445
##    [8821]   38.239596962   30.484698053   20.533578724   32.763907252   22.7306
00628
##    [8826]   37.527129484  -10.622048712   -7.392984195   -6.481996631   -4.5614
25513
##    [8831]   -1.076334085    1.298659548    6.278368145    6.879597200    6.5045
82094
##    [8836]    5.268324877   -2.451417687   -3.145468836   -1.150107504   63.2895
50899
##    [8841]   49.231156455   55.621220501   70.160190041   72.430467194   76.3270
76064
##    [8846]   80.912978377   66.838861860   68.473149553   33.703852758   21.6275
23873
##    [8851]   26.857553724    9.519362714    9.739019900    9.192495967    6.4928
20696
##    [8856]    6.532586274   10.628943974   10.743739065   10.861827700   10.9215
94306
##    [8861]   11.052321096   10.989930840   10.695578994   10.489266801   14.3686
78687
##    [8866]   20.302925772   48.834643129   51.250643279   72.559992759   86.8023
05646
##    [8871]   92.013478335   73.538017202   92.078271249   63.314931283   73.0575
62651
##    [8876]   11.410632682   12.473177195   12.021962967    8.780509449    9.0731
65224
```

```
## [8881]  13.275373198  13.302226019  13.265082989  13.184206918  13.1367
82143
## [8886]  13.035929409  12.932189492  63.286266071  62.546818650  54.0790
61173
## [8891]  57.870794158  61.641163221  63.391734189  63.918735081  61.7417
89298
## [8896]  58.976118710  55.179205681  52.958470090  47.663464387   9.4233
22432
## [8901]   9.141831211   9.022424117   6.465146711   6.602351532  10.7010
73361
## [8906]  10.720980958  10.784468742  10.844986349  11.162812467  11.1381
05385
## [8911]  11.042900707  49.076592138  53.234111388  49.841753317  54.4309
20403
## [8916]  76.169818029  85.163611510  62.689651726  53.294728348  58.1476
32741
## [8921]  44.667768108  58.855021149  54.966127025   5.039023781   7.4368
70609
## [8926]   6.483461580   1.677250602   1.805408414   6.032542022   6.3698
34074
## [8931]   6.648639517   6.730742924   7.622243314   8.264327610   8.4332
27388
## [8936]  91.985442667  88.174266743  87.990798930  95.836786576  97.8917
90961
## [8941]  99.576759411  96.735729779  94.124893714 100.754891048  71.3130
29142
## [8946]  51.522754182  66.972220571   6.878762591   9.712728167   8.9952
01474
## [8951]   5.406796718   5.308236042   9.332141486   9.311712842   9.3015
73684
## [8956]   9.303640278   9.569695369   9.619653162   9.580819826  54.9354
21087
## [8961]  52.738560071  57.020129623  74.325217965  65.410614654  75.3853
83977
## [8966]  84.855611561  89.043778603  89.929465428  94.068953148  62.6863
89268
## [8971]  71.134168336   4.884253675   7.919934787   7.429236932   5.4295
77853
## [8976]   5.352511479   9.390620415   9.316508791   9.257456566   9.2016
52951
## [8981]   8.945284168   9.052818288   9.217773572  65.243731645  62.1839
48496
## [8986]  56.265234184  61.804741776  66.121214429  68.493149447  69.6415
46015
## [8991]  68.361992423  66.589987679  61.649874572  51.206757556  58.1251
81122
## [8996]   9.806904750  12.320382977  11.446298786   6.854432378   6.8371
21538
```

```
##  [9001]  11.007490443  11.037692051  11.087722388  11.087245146  11.4342
41497
##  [9006]  11.568974944  11.614621833  36.627316901  53.986522089  54.7460
15314
##  [9011]  63.350839522  85.108180333  88.809399755  72.378560665  69.6098
47962
##  [9016]  67.112538661  62.465891941  54.759025746  84.550154518   8.0079
39404
##  [9021]  10.121297707   9.489676689   6.216297590   6.326874833  10.4253
05036
##  [9026]  10.479423504  10.452827713  10.406008512  10.427673899  10.1882
64922
##  [9031]   9.951348278  89.862026802  89.273324031  88.065770642  96.2290
60304
##  [9036]  97.985757024  99.437101641 100.159846558  99.994513511 100.3031
41670
##  [9041]  95.777352161  75.104628621  87.110189051   3.341267066   5.2869
11615
##  [9046]   4.029409767  -0.684650591  -1.251021747   2.037647281   1.1256
13905
##  [9051]  -0.499152927  -1.645387240  -9.676799192 -10.029835871 -10.2895
13024
##  [9056]  69.872454649  66.099810425  70.274629729  85.280698346  89.3255
51695
##  [9061]  91.672731132  93.248564957  93.460935748  95.284117360  96.6138
92763
##  [9066]  79.950937763  84.852708400   7.877119538   9.605173692   8.7640
51228
##  [9071]   4.702359087   4.728669088   8.753806363   8.695336217   8.6284
55125
##  [9076]   8.583220520   8.631794374   8.427567342   8.435182530  77.2598
02442
##  [9081]  77.418554727  88.731852979  96.577938204  98.589283719  99.2050
21721
##  [9086]  99.685551581  99.461390899  96.573048227  77.997368765  77.0764
33672
##  [9091]  95.015768250   9.316803317  11.939226697  10.792023904   5.9419
30759
##  [9096]   5.760026224   9.704891589   9.340069310   9.211157643   8.9979
08235
##  [9101]   8.292696903   8.012504662   7.741514685  67.090331087  70.1653
43083
##  [9106]  79.637970550  89.454531756  90.237381606  91.161672734  90.6805
89290
##  [9111]  89.479205801  87.594778391  71.945706581  60.422811548  71.9194
30622
##  [9116]  -5.110989327  -3.285933932  -4.665990813  -9.290322694  -8.3842
73628
```

```
##    [9121]  -4.344933215  -4.217092114  -4.394725981  -4.194177641   -4.9395
80250
##    [9126]  -6.219138720  -6.691639143  28.423995499  33.912873936   42.5484
02845
##    [9131]  73.616712302  75.904048951  77.346200494  79.262186804   80.6139
81240
##    [9136]  80.511554574  78.974781531  67.188684898  79.202977605   -3.3849
20579
##    [9141]   0.017365859  -0.340326881   0.518801420   0.649443759    4.7485
08515
##    [9146]   4.541447983   4.321884517   4.093378443   2.677839720    2.5091
57435
##    [9151]   2.106053410  82.360781402  77.342738616  79.058461218   89.9684
12059
##    [9156]  90.701057005  90.168395545  94.945828121  96.120300377   97.0194
08759
##    [9161]  94.372480963  82.836904988  83.161910620   5.944656419    8.2066
00767
##    [9166]   7.270490255   2.477469332   2.366279163   2.397458310   -1.5815
48137
##    [9171]  -3.474814328  -5.429143733 -12.061616034 -11.668277859  -11.9132
08727
##    [9176]  20.170670496  25.501541716  41.861916036  59.809798225   63.7572
07370
##    [9181]  70.957359702  69.698557936  77.364752310  67.181865355   27.9373
62006
##    [9186]  32.044697421  58.465063269 -13.267806979  -8.858518411   -7.4782
65264
##    [9191]  -1.168357320  -1.401877737   2.608617567   3.102272061    3.3292
87955
##    [9196]   3.290490134  -4.089731905  -4.702089785  -3.812433296   56.7891
22112
##    [9201]  38.159081300  37.305959076  52.786117536  60.978285611   52.9813
89421
##    [9206]  61.965269835  58.651152909  51.444955842  47.845805746   58.7565
34353
##    [9211]  79.070327665  -3.717531392  -0.083021168   0.008124216   -0.5490
83311
##    [9216]  -0.784974506   3.346203533   3.490264049   3.777289044    3.9143
19183
##    [9221]   4.431260580   4.998883673   5.179373316  50.689951251   43.0822
51622
##    [9226]  34.683536636  88.220614548  95.129909067  98.918438353   99.4570
39032
##    [9231]  99.061214830  97.957246063  85.738949022  75.429685473   56.5350
51028
##    [9236]  -1.184484943  -0.829669573  -1.026762182   1.109262584    0.4480
88868
```

```
##  [9241]    3.768149898    3.387814988    3.121574961    3.130903421    5.2511
41377
##  [9246]    4.166354128    3.962591409   50.331978636   43.221894618   44.2518
46140
##  [9251]   55.337819866   53.003336799   63.044967232   57.598946944   56.5273
79008
##  [9256]   54.360440890   46.406118631   42.388769604   64.331056655    2.0768
26223
##  [9261]    2.963231815    2.361073307    0.929185758    0.652690004    3.9716
26276
##  [9266]    3.287569124    2.672329261    2.339912037    0.345131786   -0.2300
09728
##  [9271]   -0.784486938   48.186295978   16.593263084   39.460483399   32.5881
29475
##  [9276]   32.179301549   41.631110529   41.587896578   34.541099818   21.9177
02335
##  [9281]   16.421452600    9.631416144   22.550074900  -13.200732576  -13.6952
06072
##  [9286]  -14.512745691  -17.111051860  -17.094740988  -12.922105138  -11.8979
40524
##  [9291]  -11.925465759  -11.718920412   -7.622412345   -5.355677671   -4.7255
14092
##  [9296]   54.960160634   48.577290641   41.442980764   48.483615045   56.3090
99044
##  [9301]   49.417509328   53.856767047   51.369352077   44.938886492   46.1014
54642
##  [9306]   58.503527617   42.265907028  -11.433594221  -10.597691208  -11.5554
53345
##  [9311]  -15.913276086  -16.227310199  -12.534849944  -12.617407314  -13.0729
98302
##  [9316]  -13.441442295  -12.468166690  -12.220183025  -12.540321892   60.1346
14995
##  [9321]   27.750893819   11.933562386   40.738814828   45.138973671   51.5150
33662
##  [9326]   44.022367091   47.529725492   51.314842217   56.317189279   70.1765
47644
##  [9331]   43.280888751  -15.851422842  -13.461106265  -14.687864226  -14.1453
23309
##  [9336]  -15.745062871  -12.632997934  -13.291431091  -12.869142549  -11.6149
97595
##  [9341]   -1.892061779   -4.495105468   -7.340911955   13.826798090   13.0959
44156
##  [9346]    7.255116024   14.510776461   15.361384129   35.367065612   26.5420
83242
##  [9351]   23.646692947   23.316947398   27.691934372   43.302108180   47.1632
66769
##  [9356]    1.798342814    4.696599136    4.947499858    5.288062063    5.6616
65104
```

```
##   [9361]   10.381089252   10.565439752   10.623001057   10.623244005   11.4027
83209
##   [9366]   11.330727041   11.330048510   74.327243200   33.795481329   59.9617
65506
##   [9371]   77.837498982   82.050893719   65.052196875   68.616892635   62.5800
49951
##   [9376]   44.475680304   42.006015717   34.336344728   42.092454967   12.1724
76160
##   [9381]   12.167147385   11.123206603    6.023519669    6.230133269   10.4734
97245
##   [9386]   10.601728522   10.702963363   10.771413987   10.927821402   10.7763
97567
##   [9391]   10.396625768   48.776636023   54.052874083   56.108199655   67.0702
98308
##   [9396]   68.101236462   80.742216201   88.854968780   88.414334665   71.6874
77226
##   [9401]   54.554836562   45.047772164   32.017390705   -0.592743120   -0.0202
54917
##   [9406]   -0.253508970   -0.490591348   -0.906765482    2.883670443    2.8524
57136
##   [9411]    2.753591707    2.625136411    3.513687302    3.567536490    3.5989
90987
##   [9416]   48.914056930   18.920641330   13.568357425   19.642209568   19.7564
23544
##   [9421]   32.542410226   44.064152150   34.768270237   24.084827676   23.4983
63922
##   [9426]   37.653904882   42.907906226  -14.920426825  -11.896593853  -10.8432
57699
##   [9431]   -3.024731951   -1.991926505    2.876847108    3.711507144    4.2393
25865
##   [9436]    4.548254833    6.375441365    5.881345558    5.847891880   63.2168
61452
##   [9441]   63.719458199   59.047663664   67.502283670   68.596907392   75.2464
46544
##   [9446]   69.552737024   63.713588161   60.344670311   51.546554135   48.2575
39376
##   [9451]   53.484716625  -17.133620612  -14.095487091  -14.440437210  -15.0979
11703
##   [9456]  -13.080121223   -7.575976217   -6.207651094   -4.616968595   -3.5837
12623
##   [9461]    2.647676526    3.740621076    4.779801609   59.112702382   50.8718
69406
##   [9466]   64.395509308   83.107528187   89.115464677   70.464981840   72.2571
05350
##   [9471]   75.479261950   48.386539682   19.892773654   50.854570480   64.0316
10994
##   [9476]   -1.353764499    1.204864938    0.639216603   -3.997531661   -4.5823
68464
```

```
##  [9481]  -1.229764158   -3.623094501   -4.625245272   -5.485541860  -11.8988
44607
##  [9486] -11.106862196   -9.718691230   -1.222751303    1.535319817    4.4906
32179
##  [9491]  23.173779335   28.005804191   37.252202119   43.399979372   43.1684
56767
##  [9496]  31.393863338   18.475150940   18.527339799   46.980900300   -4.1039
90781
##  [9501]  -1.326607143   -1.038426408    0.429969702    1.138576444    5.7824
62829
##  [9506]   5.721267668    4.081335470    2.504952613   -5.470269367   -4.8766
66618
##  [9511]  -5.559910522   52.854663811   41.057181241   41.200500174   49.0866
39719
##  [9516]  47.405268871   61.776499685   70.894179080   42.332059771   26.6486
64716
##  [9521]  39.986854859   33.668878299   34.413044977   -3.991681607   -4.1122
05240
##  [9526]  -5.183682223   -8.782876228   -9.612445823   -5.083452375   -4.8806
91333
##  [9531]  -3.853706068   -2.312143084    3.112448040    0.293061013   -2.1998
11244
##  [9536]  81.396076540   79.982383303   82.205928588  100.190821806   99.7670
24615
##  [9541] 103.768494475  103.656442012   96.351943056   81.946473581   75.6989
21775
##  [9546]  60.640955020   74.057442724   14.342030833   14.411070145   13.4448
10584
##  [9551]   8.691075755    8.528990446   12.483681321   12.171205823   12.1891
68318
##  [9556]  11.536614769   10.356213721    9.151962222    8.831040884   46.0696
86244
##  [9561]  62.911721114   83.113902223   84.558344233   99.868912967   84.6142
93013
##  [9566]  94.691935079   94.838403438   51.241142926   33.517878113   52.9452
37636
##  [9571]  95.910966588    7.628044634   10.792227544   10.684191752    8.4401
45401
##  [9576]   8.660926907   13.249519627   13.490248393   13.149755501   12.2718
06384
##  [9581]   3.597553337    0.274623123   -1.131484461   32.337255952   14.5121
20428
##  [9586]  11.391986674   27.668462776   26.777802748   32.605546925   57.0103
79420
##  [9591]  39.911483131   45.779698060   30.308303050   44.064889518   77.5868
22534
##  [9596]  10.650677921   12.794341274   12.387078969   10.804491785   10.7266
62985
```

```
##  [9601]   14.582319096   14.341009180   14.174077876   13.994867775   13.3556
55547
##  [9606]   13.244845379   13.367698063   65.907065757   66.688600634   88.2781
62333
##  [9611]   97.786486755   98.527818175  102.576024714   99.437124106   79.8083
01436
##  [9616]   56.819724426   58.068062472   68.177406152   70.174601030   16.6247
64860
##  [9621]   17.624431423   16.033154571    9.656043698    9.419590173   13.2511
34293
##  [9626]   13.109859336   12.974294246   12.916436047   12.860433655   12.8232
91241
##  [9631]   12.479533086   95.739499278   91.629040121   92.114306973  100.1324
57000
##  [9636]  101.489286485  106.078477996  106.932162366  102.004181085   90.2365
10521
##  [9641]   82.526696085   77.739190247   73.972169922   13.183407154   14.8749
73387
##  [9646]   14.128813964    9.763658990    9.783875368   13.882682480   13.8626
13110
##  [9651]   13.811449246   13.742470141   13.859546943   13.709514586   13.5472
04576
##  [9656]   24.366846428   46.750510968   71.330725941   68.218728689   77.7460
35038
##  [9661]   85.007545713   92.188151254   93.983719428   57.622382941   68.6833
54668
##  [9666]   50.427796636   88.426552637   13.903977725   15.144998294   14.2351
04254
##  [9671]    8.453472624    8.163352690   11.962861065   11.582775732   11.3299
04418
##  [9676]   10.990812409   10.660331987   10.397054298   10.160179825   83.2554
07005
##  [9681]   67.006428418   64.919544464   80.390953038   76.791898457   80.4615
92628
##  [9686]   99.900829402   86.588822284   89.505952837   71.241227665   61.5735
44822
##  [9691]   82.564991885    8.216938349   10.142080648   10.182195731    5.8191
02380
##  [9696]    5.773133123    9.820661623    9.351982011    7.426546584    8.3781
77167
##  [9701]    5.403190613    5.386700778   51.042450512   59.416356770   61.8695
80167
##  [9706]   80.416100047   89.179820650   78.377761144   81.538048862   91.1042
60294
##  [9711]   96.371581364   80.926787507   69.465556749   79.430873667   84.4119
44848
##  [9716]    7.270237267    9.917388489    9.415863523    5.854622168    7.3107
96523
```

```
##  [9721]  11.462457879   10.085839115    9.131239388    8.996878058    8.1016
17602
##  [9726]   8.502773069    8.846167699   88.632770887   89.756849289   91.1771
65502
##  [9731] 103.747956870  107.179062633  108.662497328  102.327802253   90.1598
42295
##  [9736]  79.942371371   73.408147744   73.212565467   74.996703437   15.5152
84667
##  [9741]  16.131250842   15.337334492   12.433497511   12.238120969   15.9715
68262
##  [9746]  15.379318109   14.524358249   13.422663568   11.623454787   11.3708
08495
##  [9751]  11.504818629   25.363964257   34.893314035   64.808967518   66.4724
20910
##  [9756]  81.122538764  104.322652844  105.695827394  106.318832478   86.2110
79410
##  [9761]  89.509369193   86.500511431   88.060412720   13.558293168   15.0562
47533
##  [9766]  13.543398298    8.429351552    8.036025418   11.972118229   11.7782
17881
##  [9771]  11.517228370   11.339466935   10.438351482   10.669504782   56.0070
57070
##  [9776]  79.456377196   87.085017818   91.386721541   91.930594016   99.9042
86946
##  [9781]  99.907815379  103.867142896  103.330735030   97.765963390   88.4279
91640
##  [9786]  64.878980479   73.017591466   14.895816083   14.473953537   13.2192
09311
##  [9791]   7.910586032    7.529761684   11.495613304   11.016735574   10.6012
51458
##  [9796]   9.988446595    7.968713276    7.851339846   45.885041542   89.8721
27495
##  [9801]  87.842851402   88.806914554   97.728610410   88.372953427   90.7402
45558
##  [9806]  96.343656534   99.708281233   95.212017473   91.353283347   84.1898
05933
##  [9811]  71.478326139    4.765501161    6.873933956    6.905858414    7.1874
26517
##  [9816]   7.337563288   11.455755787   11.388095975   11.313800620   11.1332
87741
##  [9821]   6.381367114    6.677601057   53.249313938   84.724044273   88.5381
02140
##  [9826]  90.002339309  102.632573466  104.378234060  105.766129771   99.5892
63764
##  [9831]  87.328010844   77.195907173   64.810934129   60.398105067   69.5573
16013
##  [9836]   3.335951100    5.918336733    4.978009154   -0.781706272    0.1803
68441
```

```
##  [9841]   5.190084869   5.562451577   6.053902542   5.885321899   3.6763
14444
##  [9846]   4.312446379   4.328388152  34.452290174  28.758166653  52.3540
64298
##  [9851]  79.247902191  91.071128032  96.632839165  98.976905889 100.4153
89890
##  [9856]  91.674583914  82.993211785  86.945290559  83.007169806  -1.7660
14578
##  [9861]  -0.027584395  -1.508867978  -7.968923223  -6.215844246   0.4208
68296
##  [9866]   1.814694579   2.414867229   2.775811310   9.417050930   9.0500
25811
##  [9871]  92.655482745  79.450336957  86.122169447  90.566690902  97.0504
20743
##  [9876] 103.536774744 104.562880415 108.564141250 108.787038026 104.0795
97795
##  [9881]  93.219538281  79.361623354  76.298787796  14.704563165  16.0926
20865
##  [9886]  14.623400999   6.996392261   4.925394869   7.714955724   6.6406
59932
##  [9891]   6.343954648   6.193751413   3.737793138   5.163712285  27.6611
84509
##  [9896]  86.195887165  85.875644178  87.268329782 101.781991445 102.7272
18632
##  [9901] 101.088307055  96.561798589  89.237688840  91.782989901  72.9757
79083
##  [9906]  49.504276205  43.682961299   3.441555197   4.259424364   4.7445
90807
##  [9911]   7.390298357   7.636928940  11.665785010  11.646319400  11.5851
45966
##  [9916]  11.521346515  11.741808355  11.596725172  94.934552071  88.3878
06596
##  [9921]  90.230174772  91.530344763 103.835705864 105.801701497 106.7088
26695
##  [9926] 105.988153272  92.298367172  82.233649910  76.334516735  69.8693
74678
##  [9931]  79.827281033  15.779449865  15.778301247  14.339495520   7.2710
16490
##  [9936]   7.230925077  11.301139474  11.341099184  11.338667168  11.3040
68165
##  [9941]  11.201088603  11.074360767  56.356319772  69.615524439  66.3658
68336
##  [9946]  73.061496839 101.597624751  95.474692769 103.175865266 104.5171
52047
##  [9951] 106.356344781 106.720724391 103.049087728  98.189474056  97.8485
64109
##  [9956]  11.313286033  13.027508293  11.696555394   5.185124086   5.3912
22796
```

```
##  [9961]   9.576804877   9.507895573   9.356212279   9.247804304   9.1642
13181
##  [9966]   9.150807805  77.387943083  66.607171176  88.743938152  88.8456
65361
##  [9971]  91.551794656  82.688278124  75.237844451  76.341799364  63.8059
77028
##  [9976]  61.200801438  41.776561023  47.042040729  66.583805822  -8.0729
27848
##  [9981]  -4.715776805  -4.678887085  -4.200179214  -4.803817153  -0.3422
48725
##  [9986]   0.951841410   2.032773731   2.835894436   6.748781266   6.8302
82642
##  [9991]  71.312370637  86.668001358  86.709221604  87.961570293 100.5890
06841
##  [9996] 102.413886362 103.955410842 102.755959719  99.058219721 105.3407
49719
## [10001]  95.267400681  74.263060465  72.018438968  10.326535583  12.3244
36521
## [10006]  10.963935007   4.230137188   4.219450210   8.300975253   8.2032
59517
## [10011]   8.126039644   8.034597353   8.092469492   7.954533008  91.3206
70890
## [10016]  84.952141416  85.455345618  88.069312916 100.560995210 102.3998
90490
## [10021] 103.376272252 102.942008037  91.760073195  81.628477925  67.9395
98894
## [10026]  71.292068197  77.347944902  10.110478400  12.049126261  10.7510
70071
## [10031]   4.126596287   4.046125122   8.152143708   8.118028697   8.2119
43950
## [10036]   8.379456359   8.362833499   8.442738150  82.957360033  57.6009
37200
## [10041]  54.903160909  66.344796501  82.115028642  72.813544272  88.6785
80142
## [10046]  75.981735716  72.831856355  68.100497590  67.495541130  68.0529
81832
## [10051]  98.645424099  10.275307471  12.283378328  11.090038575   4.3026
27244
## [10056]   4.353439037   8.694325081   8.812658429   8.796232017   8.6314
11374
## [10061]   8.439415671   8.170760979  69.812307867  62.882149778  82.1692
10700
## [10066]  87.393215604  95.755489996  89.898470906  84.701904140  87.2335
96298
## [10071]  79.398372998  78.559583253  65.598290449  66.630304529  82.6977
63898
## [10076]  10.022044416  11.453850280  10.214878749   3.394423460   3.5934
39463
```

```
## [10081]    7.869344348     8.076777387     8.319243358     8.569124568     8.8006
92067
## [10086]    8.891635464    92.356468476    61.547398546    82.912055355    84.4617
30531
## [10091]  100.143728874    94.977401833    92.229252777    94.879222718    95.4507
66730
## [10096]  101.633478282    85.001787332    76.098556181    79.991365281     8.6265
53213
## [10101]    9.714998041     8.778134586     3.503520501     3.744910343     7.8307
15578
## [10106]    7.730867988     7.611741777     7.577684607     7.489071373     7.4609
10963
## [10111]   75.720033196    75.785517570    81.662922895    87.603406604    99.2979
97028
## [10116]  100.206188684   101.213356243   101.703224355   101.528598982   100.6609
96600
## [10121]   88.641093311    91.256334440    86.313907055    52.576984665     5.4852
10939
## [10126]    8.186708263     2.743838103     2.637423654     6.629381214     6.6892
46607
## [10131]    6.761618846     6.768447776     6.610139584     6.571777910    82.4771
32074
## [10136]   53.776421497    52.655548536    65.400944271    78.443833832    76.5991
01569
## [10141]   83.621965003    73.698863174    70.477559714    66.356888082    64.7958
63444
## [10146]   66.728053448    93.163997130    52.886646492     6.165332443     8.9197
64766
## [10151]    3.446255261     3.464008650     7.666429272     7.522127965     7.4433
60553
## [10156]    7.453591952     7.361889222     7.251836175    83.098041414    81.1905
74874
## [10161]   83.102964965    87.171003389   100.098368316   101.567906992   102.7930
05236
## [10166]  100.305213492   104.101220533   103.486851431    95.778994018    91.5614
54539
## [10171]   90.560038335    54.397416789     7.258918417     9.487826955     2.2439
44863
## [10176]    2.054908526     6.201271417     6.097077430     6.015733736     5.9271
25114
## [10181]    5.768939840     5.657480646    89.025212740    49.224464995    74.7481
71552
## [10186]   81.934589367    94.362361588    90.895841491    85.160308689    86.7388
70897
## [10191]   82.517323588    75.409241142    75.577997205    73.210501186    74.4412
25795
## [10196]   51.348163973     3.719415131     6.499962723    -0.991843641    -1.3207
29384
```

```
## [10201]     1.417935202     1.715542104     1.095024847     1.573150135     0.2029
22394
## [10206]     2.273532628    60.693652308    46.656792518    45.865832586    54.3366
56513
## [10211]    72.156343677    93.672495950   101.174482617    98.189726342    96.2567
54555
## [10216]    90.321013245    83.023480973    76.980456180    77.992807664    87.4907
95698
## [10221]     2.494986371     5.507778680     2.363967445     2.253784983     6.1852
01585
## [10226]     6.056128232     5.949423219     5.845042596     5.769086518     5.6456
92130
## [10231]    76.099253463    58.280312480    73.312754601    88.382236462   100.9981
33098
## [10236]   102.777901336   103.949163610   104.631459542   104.849716844   104.4735
59214
## [10241]    97.112138818    91.949778812    91.643795276    92.059732090     6.0284
42883
## [10246]     8.156063264     0.748156416     0.586396204     4.699863003     4.6915
71950
## [10251]     4.820901575     5.021811527     1.865215320    -0.207268656    82.5273
77426
## [10256]    61.627416449    61.823613422    82.609201685    96.927305983    93.8418
21282
## [10261]    84.465230324    89.829180571   102.279327737    99.219646409    90.3593
31348
## [10266]    79.712697728    75.222660617    48.702081170    10.318962245     8.9448
02675
## [10271]     1.468274739     1.427013028     5.444678863     5.434896712     5.3357
12233
## [10276]     5.183691648     4.735105596     4.429960687    45.643971206    39.4134
30629
## [10281]    62.690227787    86.082785384    98.367216118   101.299000902   100.2541
70597
## [10286]   100.825086175    96.949262108    57.967248991    68.438927878    75.8912
41743
## [10291]    76.143661224    91.917095069     3.891734741     6.092792286     3.3893
58215
## [10296]     3.481474337     7.150872357     6.460684552     6.007563649     6.1515
73054
## [10301]     5.265914749     5.250165360    73.903532626    63.050240550    57.2305
76233
## [10306]    60.928109590    76.765892642    95.710465300   105.075007031   103.4163
10021
## [10311]   101.823436998    97.091260544    94.652801024    91.425036002    83.1983
42484
## [10316]    84.343390167    14.123074867    15.107301404     7.597134070     7.5697
40469
```

```
## [10321]    11.573842331    11.465590335    11.355818181    11.177021332    10.9820
30748
## [10326]    10.638228199    74.840198570    66.071931297    80.438960814    92.1221
59729
## [10331]   105.921521823   107.946519647   109.400508820   107.131969135   107.7077
60693
## [10336]   110.056453912   104.191224256    99.651751640    94.031145312    82.5330
66642
## [10341]    12.962401871    13.947782004     5.349747159     5.672324238     9.8956
22306
## [10346]    10.234335377    10.427963426    10.498610714    11.219770332    11.1831
87855
## [10351]    92.372387554    75.113880996    75.553978701    92.533825908   105.7081
13101
## [10356]   102.793004189    70.146475653    96.009027146   107.556724441   105.8195
80069
## [10361]    87.838634050    69.176868201    75.796982463    45.066441009    13.8063
05108
## [10366]    14.953517500     7.123273951     7.126502284    11.141297704    11.0393
09598
## [10371]    10.913247948    10.822070567    10.409406067    10.094010714    53.9774
76037
## [10376]    44.608099202    74.403559170    89.372730813   101.693602122    98.5477
31858
## [10381]    93.108291947   102.473805601   105.720072636    82.909964560    81.8104
44534
## [10386]    82.144269603    84.635270474    95.085616099     9.609718010    11.6741
83193
## [10391]     3.914813441     3.854844004     7.875528918     7.817466666     7.7395
39527
## [10396]     7.628129235     7.397047311     7.232699479    87.198964962    86.5698
19597
## [10401]    87.063283006    88.501950112   102.592613844   104.237111210   105.1430
63347
## [10406]   105.531843784   105.621500320   105.438243790   100.248986202    98.9394
34695
## [10411]    85.132429214    80.762880973     7.919256811     9.994499811     2.3801
98167
## [10416]     2.400400852     6.399758007     6.283943455     6.309290084     6.1899
29708
## [10421]     6.108091518     6.073946885    82.822518873    81.056403535    84.9145
14970
## [10426]    86.597324676    97.493203740    96.608631255    95.513240032    94.0137
10904
## [10431]    95.536265217    98.606111899   100.237492302    98.729315667    93.6949
32996
## [10436]    43.797352289    12.330173676    11.663856313     4.686721691     4.5570
59728
```

```
## [10441]     8.401612283     8.129837585     7.872689432     7.470812141     7.3891
87479
## [10446]     7.099400529    75.844422832    62.745451647    73.435660686    82.4052
75183
## [10451]    94.821210724    94.674419722    74.349557676    89.496395093    94.5543
12929
## [10456]    95.714018678    84.453226475    73.025242581    82.194433638    31.0855
96530
## [10461]    53.369209810     3.183244325     1.984647809     1.939560194     5.0072
57841
## [10466]     4.648755390     4.925495167     5.238750345     4.987550949     3.6174
03775
## [10471]    80.478916433    51.994671411    67.353978678    76.975246100   100.4069
76924
## [10476]    99.243870319    94.484163855   102.305324296   105.811361532   104.0996
71769
## [10481]   101.698686590    98.256543990    97.140457318    58.707790259     9.9878
60224
## [10486]     8.928262489     1.825647344     1.929639510     6.137616255     6.2050
42476
## [10491]     6.108289691     5.970893084     6.029100273     5.517202810    54.9272
92072
## [10496]    48.552369467    49.601913940    53.173030428    67.927163122    74.3043
70169
## [10501]    80.621852339    86.348539492    79.435479413    80.431071495    70.0738
19819
## [10506]    62.835864001    67.197645309    48.687139237     5.529026404     4.6268
25359
## [10511]    -0.641261215    -0.815161967     3.029581417     3.003185498     3.0246
99480
## [10516]     2.999013012     3.297202571     3.349397147    49.781879939    48.3639
03949
## [10521]    50.058120292    59.016248767    71.320695421    81.231893790    74.8754
11456
## [10526]    82.376329669    83.548524058    76.688956132    63.523635066    63.3374
43139
## [10531]    63.811413388    24.206240227     9.313474778     8.063430019     0.3613
47212
## [10536]     0.296357763     4.394384117     4.515514976     4.654262033     4.8234
30410
## [10541]     5.189066669     5.347856892    76.611004662    61.484284605    74.0571
26750
## [10546]    84.339653596   101.662603248   103.274942793   104.335154867   104.9335
09097
## [10551]   102.877287828   104.892424271    96.507830838    91.647017379    87.5136
69897
## [10556]    18.614224851    48.638481725     9.617575006     2.095823609     2.3061
39360
```

```
## [10561]     6.542827808     6.665837876     6.793215045     6.832494036     6.8180
16723
## [10566]     6.815936242    87.740379865    69.969604061    70.221615104    78.5605
39245
## [10571]    99.781956608    90.321751566    77.764597440   100.914207982    91.0788
55284
## [10576]    94.836639437    75.262863348    82.483211535    80.058518274    30.0909
73031
## [10581]    11.173532621    10.496561565     2.454447028     2.557437118     6.6904
51078
## [10586]     6.668139643     6.696056290     6.764588818     6.810894348     6.8545
27585
## [10591]    62.146661678    53.229206347    52.008240088    55.841019723    71.7175
76252
## [10596]    48.753406738    84.065901333    90.347192877    75.334685812    76.2988
71161
## [10601]    73.656512897    67.535665687    64.789569693    25.883895843    10.7944
73618
## [10606]    10.286652276     2.270925139     2.280480011     6.412513412     6.4734
82593
## [10611]     6.599209102     6.687670229     6.800131407     6.935508963    55.6353
43549
## [10616]    49.620459624    53.417699785    62.036978835    76.224614511    84.5857
08122
## [10621]    79.952006880    85.727028027    87.031328395    81.434298138    67.5249
26924
## [10626]    63.026816281    60.130205882    31.284593245    11.708967181    11.6839
36064
## [10631]     3.905318370     4.278413684     8.644229202     8.868766531     8.9812
09824
## [10636]     9.080252253     9.099543679     9.065525349    90.438825374    82.3921
57897
## [10641]    85.763825360    88.675249283   102.740495337   104.036173216   105.2250
94525
## [10646]   105.932396286   104.380484813   106.063486076    97.394101457    91.2290
88906
## [10651]    79.275871109    26.986150738    13.128377325    12.317720637     4.1228
91782
## [10656]     4.333794077     8.482246580     8.598381286     8.687996505     8.6968
39920
## [10661]     8.880336899     8.992517795    85.672154090    81.538355542    85.6833
00090
## [10666]    88.503570631    99.749466896    91.274770577    80.421624038    98.9816
69750
## [10671]    92.163065598    96.565843338    76.346553252    78.938952714    74.3608
54479
## [10676]    34.403643223    10.442752669    10.262287694     2.833299669     2.9393
37620
```

```
## [10681]     7.154287810     7.301793935     7.709023499     8.184068871     9.3252
94925
## [10686]     9.544122164    93.102064567    85.471224671    86.462302380    89.5921
90678
## [10691]   103.991311598    80.760197938   104.051654271   106.819400825    98.7576
72605
## [10696]    98.037254345    96.752052987    94.279561001    85.593775985    38.0504
11159
## [10701]    12.129063792    11.793232464     3.316902700     3.267189579     7.4667
95116
## [10706]     7.555567820     7.587274247     7.515730656     7.674405189     7.7751
85742
## [10711]    88.252581505    82.467403893    85.678022039    88.167763921   101.9023
55597
## [10716]   103.216550362   104.353778916   105.076539551   105.206160511   104.9481
05933
## [10721]   100.022883995    94.701943035    84.657681173    37.346976015    10.2117
48014
## [10726]     9.719780603     1.499891566     1.551026110     5.523964663     5.3219
87338
## [10731]     5.371563997     5.291199015     5.383539336     5.541919338    89.2787
86521
## [10736]    79.843656609    71.891039438    73.695124768    93.093397789   101.4662
24954
## [10741]   100.668043501    96.355688132   101.068563697    97.729106574    88.9689
60584
## [10746]    82.485550552    68.994888151    17.653016890     2.159122028     2.3885
65388
## [10751]     0.108885171     0.251388853     4.193106956     3.873146903     3.4514
98464
## [10756]     3.108439082     2.465705574     2.170237561    77.250661401    76.7661
05340
## [10761]    81.124262453    84.514381273    97.154732739    98.877599443    99.9258
13024
## [10766]    99.789916168    99.038560808    97.049807596    81.876351591    77.6122
53217
## [10771]    72.447458575    26.110243639    -3.350766728    -3.078598150    -6.2123
24593
## [10776]    -4.982830395     0.079750049     0.877901962     1.280066854     1.5360
70961
## [10781]     3.243147882     3.300567620    80.718779107    78.543928678    83.0960
39503
## [10786]    86.001894236    99.621629008   100.765036837   101.910801339   102.3741
87180
## [10791]   101.461618407    99.094533728    78.890699889    75.320594867    61.4516
61671
## [10796]    20.687982885    -3.044598685    -3.176520090    -4.910318980    -4.5467
55215
```

```
## [10801]   -2.472175922   -5.928452784   -7.216006883   -6.654620527     0.3056
60427
## [10806]    1.186842458   68.964238328   71.462581361   80.251245955    84.9258
94186
## [10811]   93.133528219   98.016778936   78.323231159   85.881305623    78.7787
08058
## [10816]   73.351511210   79.792581281   77.576613027   67.314086302    28.0717
85733
## [10821]    6.322700101    5.933350824   -0.042411146   -0.031834078     3.9264
86918
## [10826]    3.840533962    3.811563451    3.770101100    3.715105711     3.5567
75916
## [10831]   68.649920702   70.948842887   70.127066294   73.378026459    91.9807
90687
## [10836]   99.656513369  100.362898726   95.871164914   93.400628479   101.6443
49997
## [10841]   96.024860642   75.518421827   63.666074330   41.952899447     9.0472
36697
## [10846]    8.226939611   -1.266556983   -1.014083580    2.750971424     2.3444
31312
## [10851]    2.090320290    1.901412322   -0.218831613   -1.157505629    70.4640
55645
## [10856]   42.700701265   54.276470625   70.972475562   71.776199125    73.5106
71279
## [10861]   77.814715047   78.827307354   73.071925199   60.505520857    52.9898
46919
## [10866]   48.937239879   56.286581065   24.683983079    3.656380719     3.5940
03586
## [10871]    2.515216845    2.545246164    6.620774642    6.415568425     6.1663
29554
## [10876]    5.842635263    5.561178129    5.443600308   78.864467749    73.1298
64097
## [10881]   81.769177245   88.084866722  101.869591266  103.559834269   105.6856
43121
## [10886]  105.330776824   89.908229162   78.843445461   74.200137364    69.7419
40023
## [10891]   84.567576374   47.697196318    7.439365558    8.304661338     1.2864
35373
## [10896]    0.117765063    3.949936949    3.585797230    3.130932737     2.8299
91289
## [10901]    1.666376424    2.741908444   66.006568339   67.754444950    80.1891
47777
## [10906]   87.179990150   95.923467799   90.904408607   61.427870947    84.1368
66858
## [10911]   78.765690134   78.269251582   78.190406613   78.716394388    68.8653
44398
## [10916]   40.406521798    5.640501367    7.020492167    3.043774603     3.0075
26653
```

```
## [10921]    7.014567997    6.947048307    6.788113205    6.667122978    6.6861
29676
## [10926]    6.507484478   66.723131294   49.692930467   58.765991959   83.8873
40979
## [10931]   93.748142273  101.622294105  101.135993543  103.300500460   85.5192
87612
## [10936]   85.180424359   69.665541657   57.557089060   67.172599120   55.2934
66439
## [10941]    9.426669133    9.310288709    0.509293492    1.251048599    5.5347
20483
## [10946]    5.637245030    5.604995017    5.520206651    5.633320100   50.8706
68208
## [10951]   77.816500821   56.500405329   65.740019311   77.495999837   91.2490
68789
## [10956]   90.403923036   95.429415133   88.399962654   71.487315680   49.8492
25610
## [10961]   33.629850763   31.932943651   49.869123346   36.023168892    7.2262
58639
## [10966]    7.920487766    2.803625322    3.099253853    7.172788353    7.0818
15963
## [10971]    7.018353263    6.909884474    6.871410278   52.132913377   69.8812
61848
## [10976]   78.714672982   83.269031335   88.568565962   98.899044262   93.7417
28048
## [10981]  103.619128584  101.334539198   77.560511437   58.204317321   54.3306
55366
## [10986]   55.752249155   83.052399134   63.996841382   12.050469403   12.1629
02250
## [10991]    3.967140704    4.115188385    8.323777218    8.324006370    8.3615
28682
## [10996]    8.365025392    8.151804014   53.513951706   78.807776879   79.6674
27396
## [11001]   85.728772004   88.980240948  103.295847291   97.014120113   85.7914
03409
## [11006]   99.417189512   99.353026407  102.320959552   93.461096810   93.1676
04584
## [11011]   85.873944938   52.602402226    3.380895789    4.067423214   -3.7292
96972
## [11016]   -2.573131331    2.727954542    3.023013674    3.155293777    3.3306
38963
## [11021]    4.371401500   49.614250228   77.355722538   59.549767185   61.5796
64785
## [11026]   80.994537894   92.709889836   99.308729773   99.612330342  102.3209
05734
## [11031]   91.875647758   85.195696727   72.863589658   46.906246688   77.0331
14614
## [11036]   63.161998818    9.277147320   10.113605642    2.018901509    2.0663
41386
```

```
## [11041]    6.202793864    6.221125745    6.287611817    6.380873847    6.6360
71416
## [11046]   90.191872742   86.306017686   85.855305277   86.068315684   82.9777
98424
## [11051]   99.309606954   99.759187822  102.014795497   97.198033618   87.8932
72740
## [11056]   78.375298535   68.296969210   67.424594884   76.851554125   56.5015
58932
## [11061]    8.171960659    8.894232232    0.503045236    0.612445416    4.8666
50049
## [11066]    5.027921398    5.318753380    5.477103880    5.337668829   66.0826
90676
## [11071]   76.073017982   84.164977021   84.901795761   84.923166196   86.7197
89223
## [11076]   84.363094250   63.746443758   59.517511460   58.905276479   41.2770
74501
## [11081]   31.239743031   36.917257944   55.762864504   39.039640504    5.0766
16172
## [11086]    5.261911301   -1.660776360   -3.584637124    0.915896274    0.7988
79770
## [11091]    0.377021929    0.290683619    3.362246536   62.700043998   80.8969
46478
## [11096]   80.330325878   80.070046491   80.352425808   87.557701522   91.6121
71070
## [11101]   95.451226891   98.088333707   99.155433457   98.013517658   92.8145
22136
## [11106]   89.966232875   85.740037814   66.243205101    0.363210384    2.8959
49329
## [11111]   -0.155016315   -0.001636094    3.927143000    3.785444592    3.5673
78604
## [11116]    3.328494692    2.758071393   86.041991701   82.142852566   82.2261
68723
## [11121]   83.716477059   85.481279954  100.503452477  102.055891179  103.4017
73945
## [11126]  104.188003741  103.797674828  104.064249049   99.164663683   73.0783
71361
## [11131]   82.306361013   64.766157540    6.936817558    7.505700451   -0.7588
40945
## [11136]   -0.384634869    3.796148447    3.794218804    3.797957927    3.8632
22029
## [11141]    4.111584407   87.685253720   60.738906393   51.573480864   60.6046
32281
## [11146]   50.401006708   75.372289586   95.525767758   96.352387521   86.8045
45816
## [11151]   81.842921377   73.328594594   57.079917411   54.950108718   64.3950
78010
## [11156]   64.194944117   -8.821831829   -4.948959959   -3.324266556   -1.8181
62484
```

```
## [11161]     2.781670195     2.896466643     2.988847751     3.158838703     3.8392
52862
## [11166]    22.964942417    55.872769710    44.976967329    51.000930370    65.2568
31353
## [11171]   100.619813822   103.055562795    77.063889374    66.299206843    54.3465
02496
## [11176]    41.967952783    42.707642282    64.790607358    78.644587658    37.5428
30270
## [11181]     7.378695495     7.000848937    -1.775136545    -1.539465307     2.6385
36905
## [11186]     2.659259456     2.775465975     2.760906252     2.895535512    52.1974
52774
## [11191]    83.249205852    81.781195160    84.015263351    85.573676097    99.5199
61978
## [11196]   100.700364302   101.933514537   102.293305834   101.285770074    99.3514
16220
## [11201]    95.524579354    92.840258877    90.683153023    58.303062850     6.0679
91921
## [11206]     6.462716544     0.884745407     1.355281847     5.714708677     5.8211
33078
## [11211]     5.814205713     5.690920893     5.324445659    73.704751528    52.1724
85878
## [11216]    73.216571761    88.264067710    88.673249875   103.528718689   104.9393
46196
## [11221]   105.895085806   103.114345208    72.157343190    89.409366758    65.3961
11491
## [11226]    58.197031497    64.655701703    50.495050904    13.258385978    12.4755
84174
## [11231]     4.083591602     4.081602962     8.064691684     7.980645881     7.8926
38559
## [11236]     7.774656491     7.773630950    76.075298042    69.310611178    58.8796
08483
## [11241]    65.897193152    58.208070680    81.970284650    99.920190588   102.6382
22029
## [11246]    96.786269735    93.674980601    86.178396896    79.632801860    74.8843
42900
## [11251]    80.571095956    68.851458990    11.598290280    11.435480705     2.4406
12470
## [11256]     2.549829339     6.722784888     6.743737591     6.813852033     6.8480
07756
## [11261]     6.740133231    52.131749268    58.746148474    50.011824063    55.2111
27106
## [11266]    67.344878510    99.968625688   103.608381143    98.531316959    83.8183
85369
## [11271]    77.792767083    68.715702559    40.453029713    88.197081178    85.1316
38766
## [11276]    40.904990872     3.944980207     4.469313616    -3.510644192    -3.6612
30082
```

```
## [11281]     0.566994712     1.178017263     1.506447711     1.387722912     3.0951
43521
## [11286]    74.210067074    83.283505528    82.830496495    84.911195921    86.4999
51640
## [11291]   101.102484852   102.753019488   103.384610810   103.172242672   101.7223
96566
## [11296]   100.028587073    95.405456201    91.136938503    87.885810310    39.8629
20011
## [11301]     1.723184353     2.362978671    -7.553256400    -5.712094012    -0.1581
20476
## [11306]     0.761724657     1.371982444     1.934732912     4.170013175    75.0035
98433
## [11311]    55.283104027    71.458661466    85.577121400    87.281491059   101.5346
88861
## [11316]   102.868237355   103.113300063    98.293782073    68.768877573    79.3336
73471
## [11321]    50.975782663    45.248018627    52.263949324    27.468044462     0.2467
98122
## [11326]     1.470490142    -0.849299978    -0.906722123
```

Code

Residuals
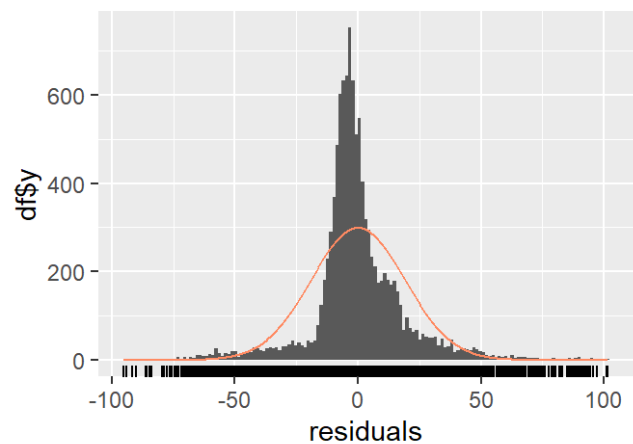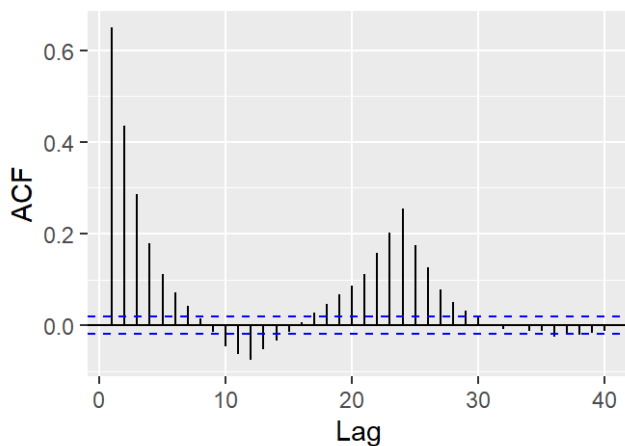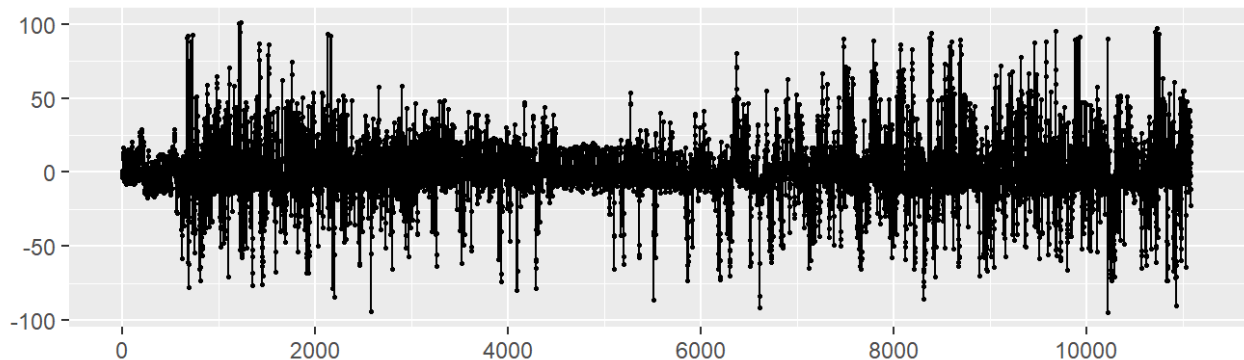
```
##
##  Breusch-Godfrey test for serial correlation of order up to 12
##
## data:  Residuals
## LM test = 4778.9, df = 12, p-value < 2.2e-16
```

Code
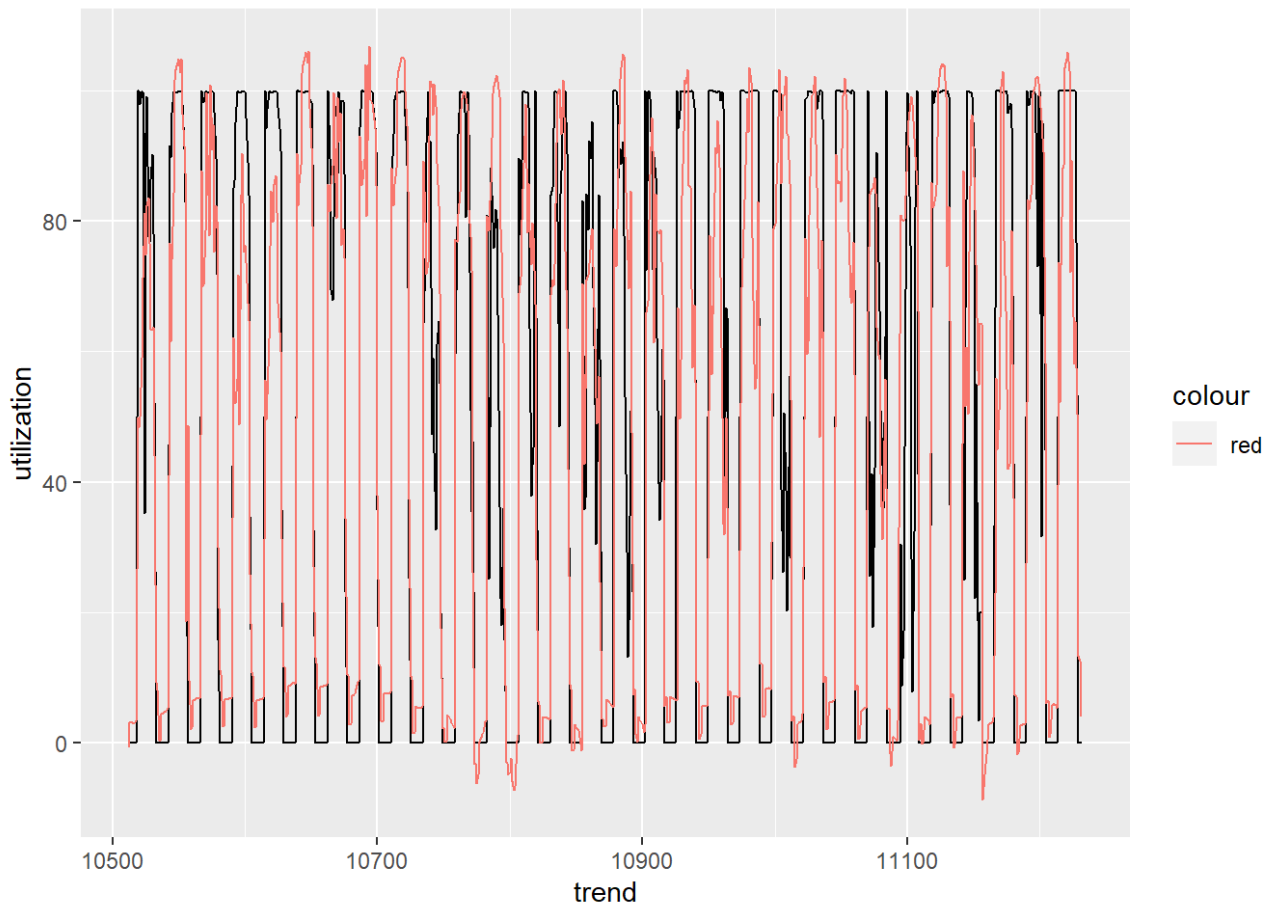
Code

9.2 Negative and Invalid results

We eliminated the negative predictions and equalized them 0.

Code

9.3 Non-productive hours

We observe that there is no production during 21:00-04:00 since there is no sun arround whole year in thpse times so we are directly equalizing them to 0.

Code

9.4 Better Predictions

As we eliminated negative predictions and we equalized production to 0 during 21:00-04:00 predictions look better
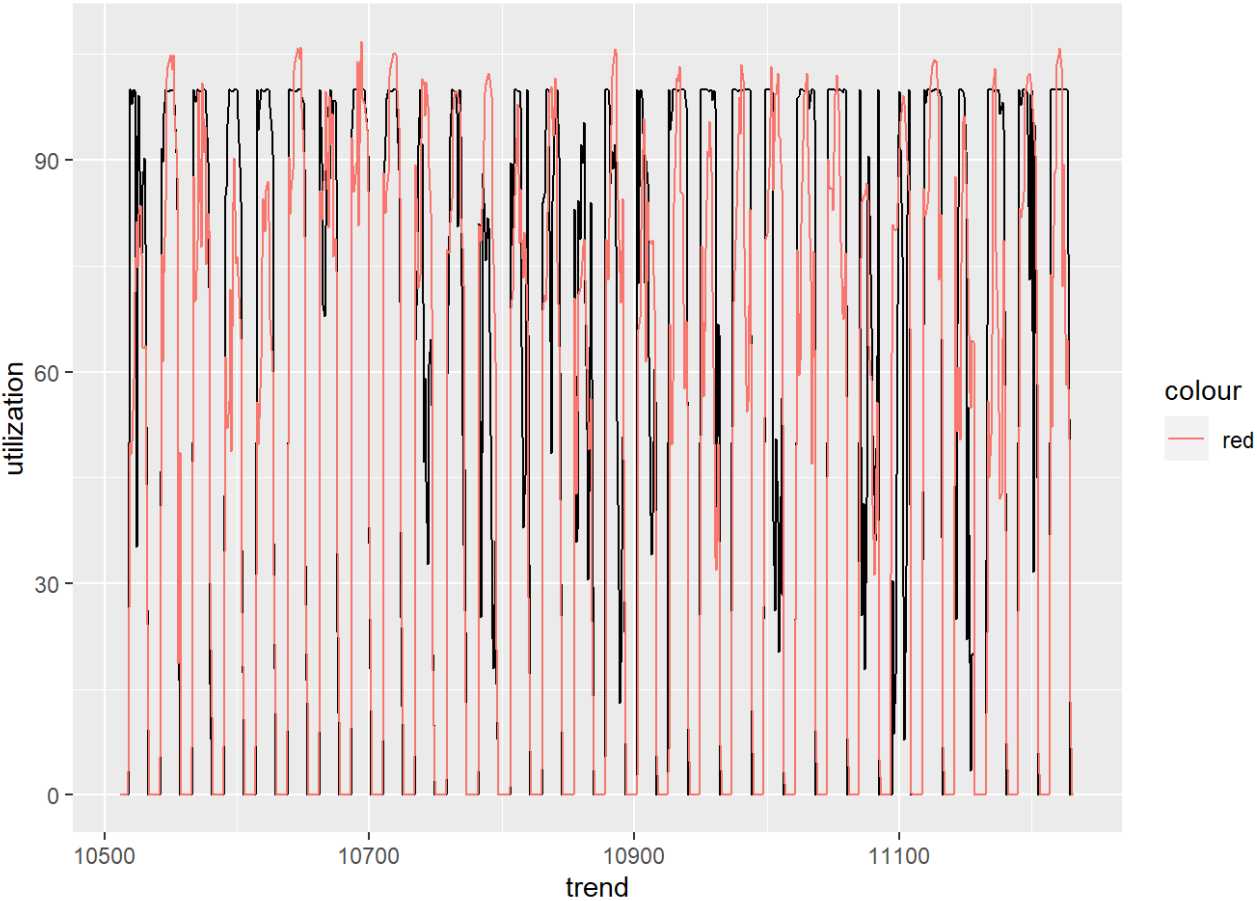
10 Predicting

```
##  [1]    0.0000000    0.0000000    0.0000000    0.0000000    0.0000000   75.003
5984
##  [7]   55.2831040   71.4586615   85.5771214   87.2814911  101.5346889  102.868
2374
## [13]  103.1133001   98.2937821   68.7688776   79.3336735   50.9757827   45.248
0186
## [19]   52.2639493   27.4680445    0.2467981    0.0000000    0.0000000    0.000
0000
```

```
##  [1]   0.00   0.00   0.00   0.00   0.00   0.12   7.37  27.66  35.00  35.00  35.00  3
5.00
## [13]  35.00  35.00  35.00  35.00  35.00  25.42   9.44   1.89   0.00   0.00   0.00
0.00
```

```
## [1]  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000  0.0900
0432
## [7]  4.07436477 19.76546576 29.95199249 30.54852187 35.53714110 36.0038
8307
## [13] 36.08965502 34.40282373 24.06910715 27.76678572 17.84152393 11.5020
4634
## [19]  4.93371682  0.51914604  0.00000000  0.00000000  0.00000000  0.0000
0000
```

The utilization data is differenced with 72 hour lagged values.

This is done to achieve stationarity.

72 is chosen sincedaily seasonality is apparent in data and the last data point we have to predict is 72 data point prior.

Code

```
## Warning: Removed 144 rows containing missing values (geom_point).
```
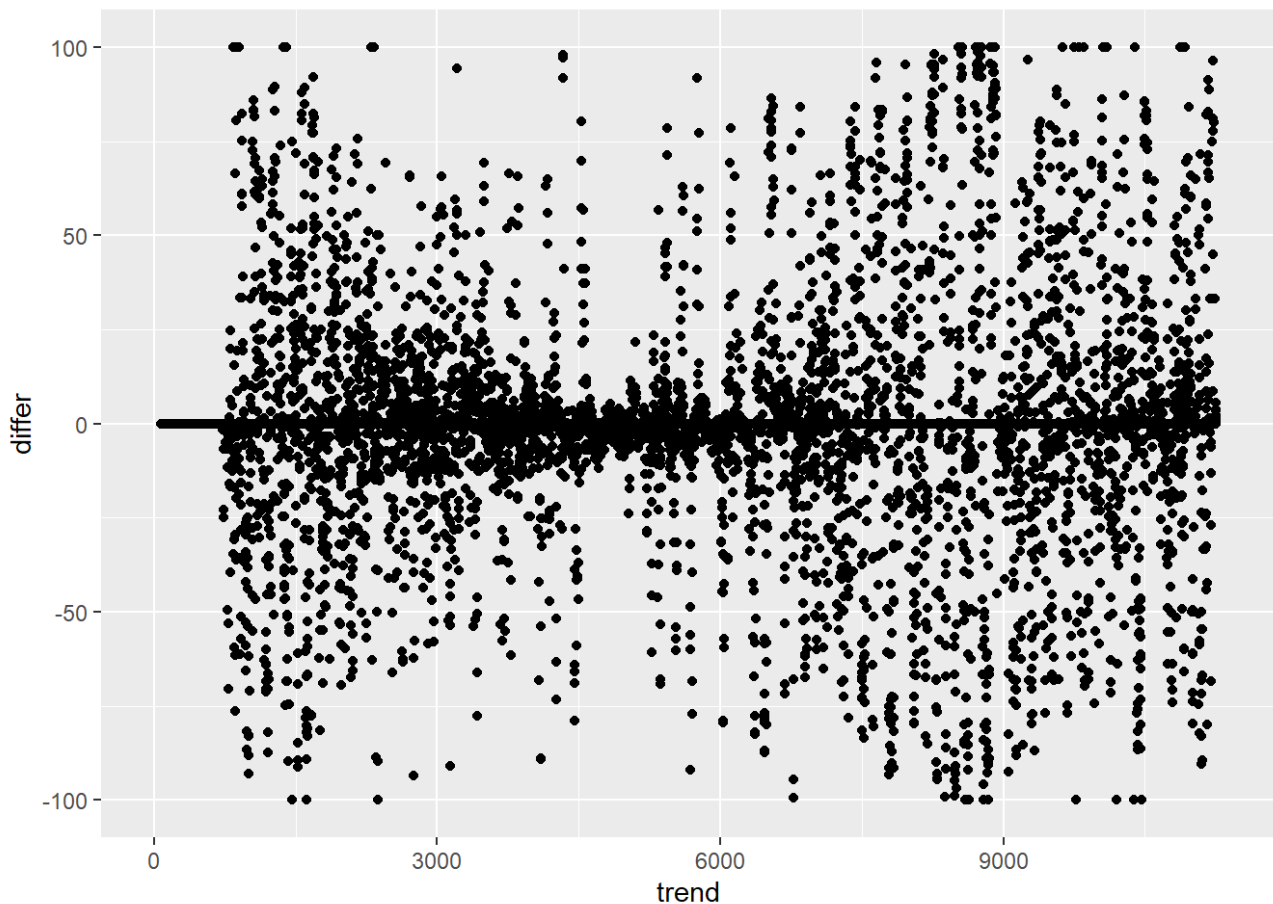

Code

```
##    [1]    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15   16   1
7   18
##   [19]   19   20   21   22   23   24   25   26   27   28   29   30   31   32   33   34   3
5   36
##   [37]   37   38   39   40   41   42   43   44   45   46   47   48   49   50   51   52   5
3   54
##   [55]   55   56   57   58   59   60   61   62   63   64   65   66   67   68   69   70   7
1   72
##   [73]   73   74   75   76   77   78   79   80   81   82   83   84   85   86   87   88   8
9   90
##   [91]   91   92   93   94   95   96   97   98   99  100
```

The visual iinspection seems statitonary.

10.1 KPSS Test for Stationarity

Code

```
##
## ########################
## # KPSS Unit Root Test #
## ########################
##
## Test is of type: mu with 13 lags.
##
## Value of test-statistic is: 0.05
##
## Critical value for a significance level of:
##                  10pct  5pct 2.5pct  1pct
## critical values 0.347 0.463  0.574 0.739
```

Code

Series avgmerged[complete.cases(avgmerged)]$differ

Series avgmerged[complete.cases(avgmerged)]$differ

Kpss test does not reject the stationarity hypothesis in any level of significance.
Acf and pacf does suggest a (p,0,0) might explain the model well. Since the acf graph
resembles Sinusodial and pacf has one significant spike and that's it.

11 Arima Model

Code

```
## 
##   ARIMA(0,0,0) with zero mean     : 102630.4
##   ARIMA(0,0,0) with non-zero mean : 102632.1
##   ARIMA(0,0,1) with zero mean     : 97767.2
##   ARIMA(0,0,1) with non-zero mean : 97769.05
##   ARIMA(0,0,2) with zero mean     : 96241.12
##   ARIMA(0,0,2) with non-zero mean : 96243.02
##   ARIMA(0,0,3) with zero mean     : 95634.19
##   ARIMA(0,0,3) with non-zero mean : 95636.11
##   ARIMA(0,0,4) with zero mean     : 95341.2
##   ARIMA(0,0,4) with non-zero mean : 95343.14
##   ARIMA(0,0,5) with zero mean     : 95234.97
##   ARIMA(0,0,5) with non-zero mean : 95236.91
##   ARIMA(1,0,0) with zero mean     : 95096.14
##   ARIMA(1,0,0) with non-zero mean : 95098.1
##   ARIMA(1,0,1) with zero mean     : 95063.55
##   ARIMA(1,0,1) with non-zero mean : 95065.51
##   ARIMA(1,0,2) with zero mean     : 95062.08
##   ARIMA(1,0,2) with non-zero mean : 95064.05
##   ARIMA(1,0,3) with zero mean     : 95062.9
##   ARIMA(1,0,3) with non-zero mean : 95064.87
##   ARIMA(1,0,4) with zero mean     : 95063.38
##   ARIMA(1,0,4) with non-zero mean : 95065.35
##   ARIMA(2,0,0) with zero mean     : 95065.37
##   ARIMA(2,0,0) with non-zero mean : 95067.34
##   ARIMA(2,0,1) with zero mean     : 95060.44
##   ARIMA(2,0,1) with non-zero mean : 95062.19
##   ARIMA(2,0,2) with zero mean     : Inf
##   ARIMA(2,0,2) with non-zero mean : Inf
##   ARIMA(2,0,3) with zero mean     : 95065.61
##   ARIMA(2,0,3) with non-zero mean : 95067.58
##   ARIMA(3,0,0) with zero mean     : 95062.96
##   ARIMA(3,0,0) with non-zero mean : 95064.93
##   ARIMA(3,0,1) with zero mean     : 95066.95
##   ARIMA(3,0,1) with non-zero mean : Inf
##   ARIMA(3,0,2) with zero mean     : Inf
##   ARIMA(3,0,2) with non-zero mean : Inf
##   ARIMA(4,0,0) with zero mean     : 95063.83
##   ARIMA(4,0,0) with non-zero mean : 95065.8
##   ARIMA(4,0,1) with zero mean     : 95066.33
##   ARIMA(4,0,1) with non-zero mean : 95068.3
##   ARIMA(5,0,0) with zero mean     : 95064.3
##   ARIMA(5,0,0) with non-zero mean : 95066.27
## 
## 
## 
##   Best model: ARIMA(2,0,1) with zero mean
```

Code

Residuals from ARIMA(2,0,1) with zero mean
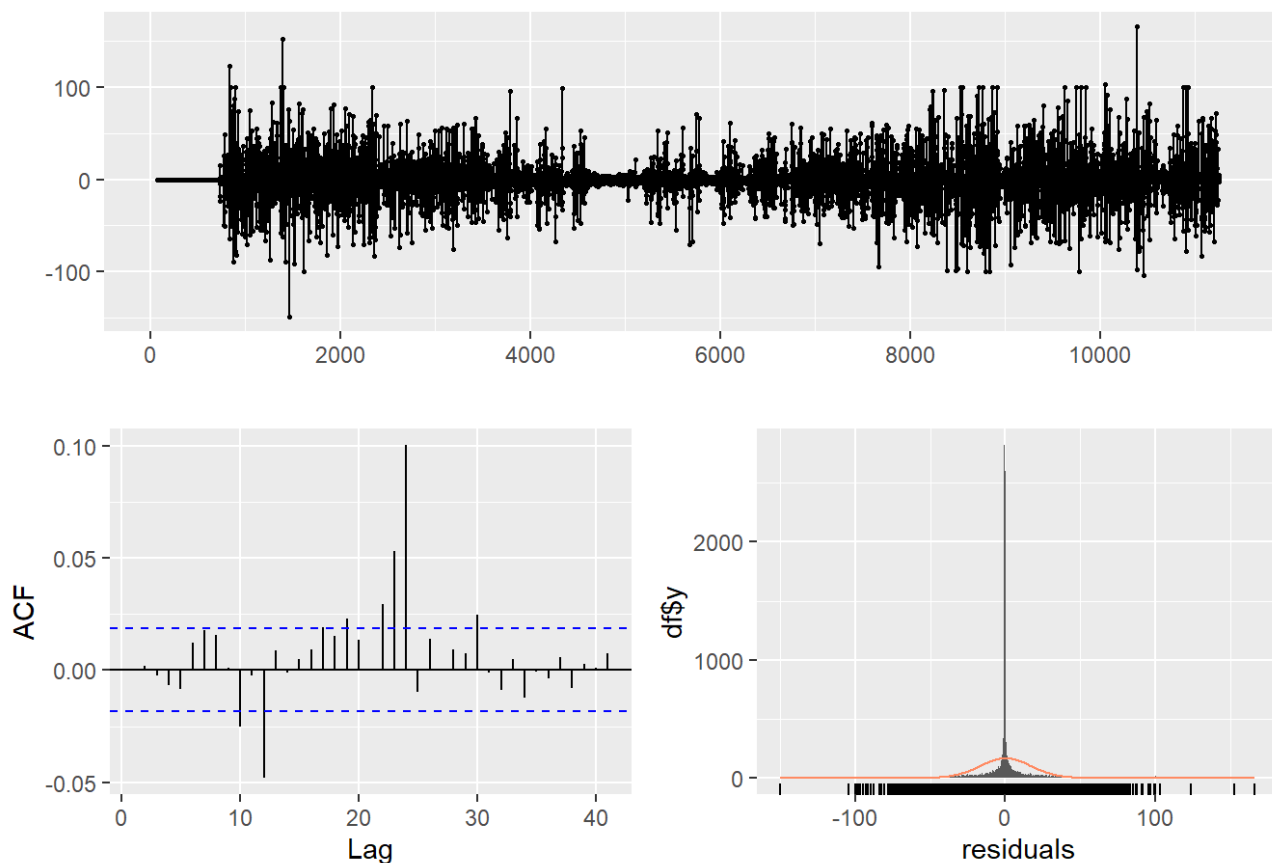


```
##
##   Ljung-Box test
##
## data:  Residuals from ARIMA(2,0,1) with zero mean
## Q* = 16.532, df = 7, p-value = 0.02068
##
## Model df: 3.    Total lags used: 10
```

auto.arima found ARIMA(2,0,1) as the model best describing the data.

The residuals does look like iid with 0 mean and constant variance.

Regression predictions are modeled with the actual values.

Arima Forecast
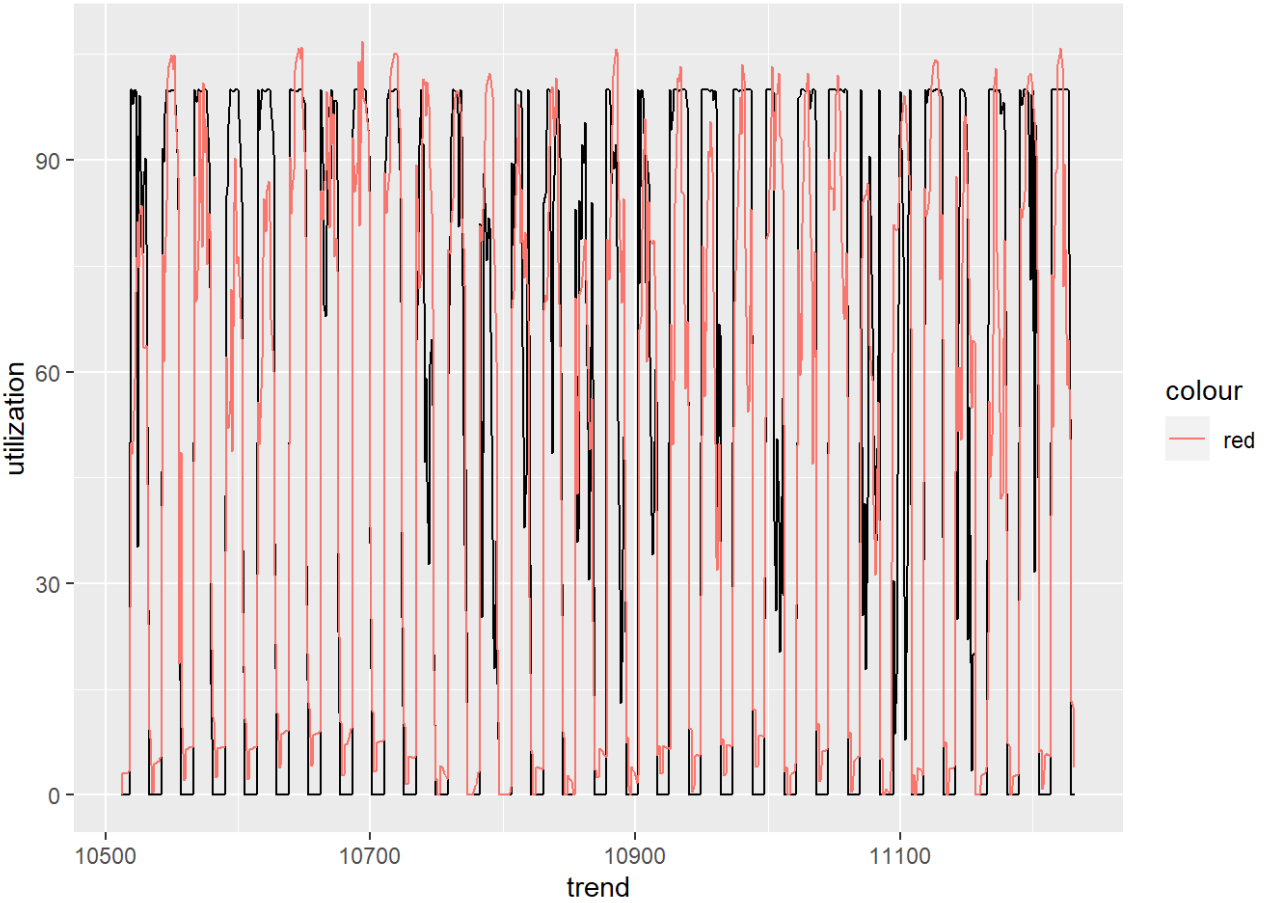
Code

```
##         Point Forecast      Lo 80     Hi 80      Lo 95      Hi 95
## 11329    2.360513e-10 -30.48342  30.48342 -46.62037  46.62037
## 11330    1.819831e-10 -30.48342  30.48342 -46.62037  46.62037
## 11331    1.402994e-10 -30.48342  30.48342 -46.62037  46.62037
## 11332    1.081634e-10 -30.48342  30.48342 -46.62037  46.62037
## 11333    8.338832e-11 -30.48342  30.48342 -46.62037  46.62037
## 11334    6.428801e-11 -30.48342  30.48342 -46.62037  46.62037
## 11335    4.956267e-11 -30.48342  30.48342 -46.62037  46.62037
## 11336    3.821021e-11 -30.48342  30.48342 -46.62037  46.62037
## 11337    2.945806e-11 -30.48342  30.48342 -46.62037  46.62037
## 11338    2.271061e-11 -30.48342  30.48342 -46.62037  46.62037
## 11339    1.750869e-11 -30.48342  30.48342 -46.62037  46.62037
## 11340    1.349828e-11 -30.48342  30.48342 -46.62037  46.62037
## 11341    1.040646e-11 -30.48342  30.48342 -46.62037  46.62037
## 11342    8.022833e-12 -30.48342  30.48342 -46.62037  46.62037
## 11343    6.185182e-12 -30.48342  30.48342 -46.62037  46.62037
## 11344    4.768450e-12 -30.48342  30.48342 -46.62037  46.62037
## 11345    3.676224e-12 -30.48342  30.48342 -46.62037  46.62037
## 11346    2.834175e-12 -30.48342  30.48342 -46.62037  46.62037
## 11347    2.185000e-12 -30.48342  30.48342 -46.62037  46.62037
## 11348    1.684520e-12 -30.48342  30.48342 -46.62037  46.62037
## 11349    1.298676e-12 -30.48342  30.48342 -46.62037  46.62037
## 11350    1.001211e-12 -30.48342  30.48342 -46.62037  46.62037
## 11351    7.718809e-13 -30.48342  30.48342 -46.62037  46.62037
## 11352    5.950795e-13 -30.48342  30.48342 -46.62037  46.62037
## 11353    4.587750e-13 -30.48342  30.48342 -46.62037  46.62037
## 11354    3.536914e-13 -30.48342  30.48342 -46.62037  46.62037
## 11355    2.726774e-13 -30.48342  30.48342 -46.62037  46.62037
## 11356    2.102199e-13 -30.48342  30.48342 -46.62037  46.62037
## 11357    1.620685e-13 -30.48342  30.48342 -46.62037  46.62037
## 11358    1.249463e-13 -30.48342  30.48342 -46.62037  46.62037
## 11359    9.632701e-14 -30.48342  30.48342 -46.62037  46.62037
## 11360    7.426305e-14 -30.48342  30.48342 -46.62037  46.62037
## 11361    5.725290e-14 -30.48342  30.48342 -46.62037  46.62037
## 11362    4.413897e-14 -30.48342  30.48342 -46.62037  46.62037
## 11363    3.402883e-14 -30.48342  30.48342 -46.62037  46.62037
## 11364    2.623443e-14 -30.48342  30.48342 -46.62037  46.62037
## 11365    2.022537e-14 -30.48342  30.48342 -46.62037  46.62037
## 11366    1.559269e-14 -30.48342  30.48342 -46.62037  46.62037
## 11367    1.202115e-14 -30.48342  30.48342 -46.62037  46.62037
## 11368    9.267671e-15 -30.48342  30.48342 -46.62037  46.62037
## 11369    7.144886e-15 -30.48342  30.48342 -46.62037  46.62037
## 11370    5.508331e-15 -30.48342  30.48342 -46.62037  46.62037
## 11371    4.246633e-15 -30.48342  30.48342 -46.62037  46.62037
## 11372    3.273931e-15 -30.48342  30.48342 -46.62037  46.62037
## 11373    2.524028e-15 -30.48342  30.48342 -46.62037  46.62037
## 11374    1.945893e-15 -30.48342  30.48342 -46.62037  46.62037
## 11375    1.500181e-15 -30.48342  30.48342 -46.62037  46.62037
```

```
## 11376    1.156561e-15 -30.48342 30.48342 -46.62037 46.62037
## 11377    8.916473e-16 -30.48342 30.48342 -46.62037 46.62037
## 11378    6.874132e-16 -30.48342 30.48342 -46.62037 46.62037
## 11379    5.299594e-16 -30.48342 30.48342 -46.62037 46.62037
## 11380    4.085708e-16 -30.48342 30.48342 -46.62037 46.62037
## 11381    3.149866e-16 -30.48342 30.48342 -46.62037 46.62037
## 11382    2.428380e-16 -30.48342 30.48342 -46.62037 46.62037
## 11383    1.872154e-16 -30.48342 30.48342 -46.62037 46.62037
## 11384    1.443332e-16 -30.48342 30.48342 -46.62037 46.62037
## 11385    1.112733e-16 -30.48342 30.48342 -46.62037 46.62037
## 11386    8.578585e-17 -30.48342 30.48342 -46.62037 46.62037
## 11387    6.613637e-17 -30.48342 30.48342 -46.62037 46.62037
## 11388    5.098766e-17 -30.48342 30.48342 -46.62037 46.62037
## 11389    3.930880e-17 -30.48342 30.48342 -46.62037 46.62037
## 11390    3.030502e-17 -30.48342 30.48342 -46.62037 46.62037
## 11391    2.336357e-17 -30.48342 30.48342 -46.62037 46.62037
## 11392    1.801208e-17 -30.48342 30.48342 -46.62037 46.62037
## 11393    1.388637e-17 -30.48342 30.48342 -46.62037 46.62037
## 11394    1.070566e-17 -30.48342 30.48342 -46.62037 46.62037
## 11395    8.253500e-18 -30.48342 30.48342 -46.62037 46.62037
## 11396    6.363014e-18 -30.48342 30.48342 -46.62037 46.62037
## 11397    4.905549e-18 -30.48342 30.48342 -46.62037 46.62037
## 11398    3.781920e-18 -30.48342 30.48342 -46.62037 46.62037
## 11399    2.915661e-18 -30.48342 30.48342 -46.62037 46.62037
## 11400    2.247821e-18 -30.48342 30.48342 -46.62037 46.62037
## 11401    1.732952e-18 -30.48342 30.48342 -46.62037 46.62037
## 11402    1.336015e-18 -30.48342 30.48342 -46.62037 46.62037
## 11403    1.029997e-18 -30.48342 30.48342 -46.62037 46.62037
## 11404    7.940735e-19 -30.48342 30.48342 -46.62037 46.62037
## 11405    6.121888e-19 -30.48342 30.48342 -46.62037 46.62037
## 11406    4.719654e-19 -30.48342 30.48342 -46.62037 46.62037
## 11407    3.638604e-19 -30.48342 30.48342 -46.62037 46.62037
## 11408    2.805173e-19 -30.48342 30.48342 -46.62037 46.62037
## 11409    2.162640e-19 -30.48342 30.48342 -46.62037 46.62037
## 11410    1.667282e-19 -30.48342 30.48342 -46.62037 46.62037
## 11411    1.285387e-19 -30.48342 30.48342 -46.62037 46.62037
## 11412    9.909654e-20 -30.48342 30.48342 -46.62037 46.62037
## 11413    7.639821e-20 -30.48342 30.48342 -46.62037 46.62037
## 11414    5.889900e-20 -30.48342 30.48342 -46.62037 46.62037
## 11415    4.540803e-20 -30.48342 30.48342 -46.62037 46.62037
## 11416    3.500720e-20 -30.48342 30.48342 -46.62037 46.62037
## 11417    2.698871e-20 -30.48342 30.48342 -46.62037 46.62037
## 11418    2.080687e-20 -30.48342 30.48342 -46.62037 46.62037
## 11419    1.604100e-20 -30.48342 30.48342 -46.62037 46.62037
## 11420    1.236677e-20 -30.48342 30.48342 -46.62037 46.62037
## 11421    9.534128e-21 -30.48342 30.48342 -46.62037 46.62037
## 11422    7.350311e-21 -30.48342 30.48342 -46.62037 46.62037
## 11423    5.666703e-21 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11424    4.368730e-21 -30.48342 30.48342 -46.62037 46.62037
## 11425    3.368061e-21 -30.48342 30.48342 -46.62037 46.62037
## 11426    2.596597e-21 -30.48342 30.48342 -46.62037 46.62037
## 11427    2.001840e-21 -30.48342 30.48342 -46.62037 46.62037
## 11428    1.543313e-21 -30.48342 30.48342 -46.62037 46.62037
## 11429    1.189813e-21 -30.48342 30.48342 -46.62037 46.62037
## 11430    9.172834e-22 -30.48342 30.48342 -46.62037 46.62037
## 11431    7.071772e-22 -30.48342 30.48342 -46.62037 46.62037
## 11432    5.451964e-22 -30.48342 30.48342 -46.62037 46.62037
## 11433    4.203177e-22 -30.48342 30.48342 -46.62037 46.62037
## 11434    3.240428e-22 -30.48342 30.48342 -46.62037 46.62037
## 11435    2.498200e-22 -30.48342 30.48342 -46.62037 46.62037
## 11436    1.925980e-22 -30.48342 30.48342 -46.62037 46.62037
## 11437    1.484830e-22 -30.48342 30.48342 -46.62037 46.62037
## 11438    1.144725e-22 -30.48342 30.48342 -46.62037 46.62037
## 11439    8.825230e-23 -30.48342 30.48342 -46.62037 46.62037
## 11440    6.803788e-23 -30.48342 30.48342 -46.62037 46.62037
## 11441    5.245362e-23 -30.48342 30.48342 -46.62037 46.62037
## 11442    4.043898e-23 -30.48342 30.48342 -46.62037 46.62037
## 11443    3.117633e-23 -30.48342 30.48342 -46.62037 46.62037
## 11444    2.403531e-23 -30.48342 30.48342 -46.62037 46.62037
## 11445    1.852996e-23 -30.48342 30.48342 -46.62037 46.62037
## 11446    1.428562e-23 -30.48342 30.48342 -46.62037 46.62037
## 11447    1.101346e-23 -30.48342 30.48342 -46.62037 46.62037
## 11448    8.490799e-24 -30.48342 30.48342 -46.62037 46.62037
## 11449    6.545959e-24 -30.48342 30.48342 -46.62037 46.62037
## 11450    5.046590e-24 -30.48342 30.48342 -46.62037 46.62037
## 11451    3.890655e-24 -30.48342 30.48342 -46.62037 46.62037
## 11452    2.999490e-24 -30.48342 30.48342 -46.62037 46.62037
## 11453    2.312449e-24 -30.48342 30.48342 -46.62037 46.62037
## 11454    1.782777e-24 -30.48342 30.48342 -46.62037 46.62037
## 11455    1.374427e-24 -30.48342 30.48342 -46.62037 46.62037
## 11456    1.059611e-24 -30.48342 30.48342 -46.62037 46.62037
## 11457    8.169041e-25 -30.48342 30.48342 -46.62037 46.62037
## 11458    6.297901e-25 -30.48342 30.48342 -46.62037 46.62037
## 11459    4.855350e-25 -30.48342 30.48342 -46.62037 46.62037
## 11460    3.743219e-25 -30.48342 30.48342 -46.62037 46.62037
## 11461    2.885825e-25 -30.48342 30.48342 -46.62037 46.62037
## 11462    2.224819e-25 -30.48342 30.48342 -46.62037 46.62037
## 11463    1.715218e-25 -30.48342 30.48342 -46.62037 46.62037
## 11464    1.322343e-25 -30.48342 30.48342 -46.62037 46.62037
## 11465    1.019457e-25 -30.48342 30.48342 -46.62037 46.62037
## 11466    7.859476e-26 -30.48342 30.48342 -46.62037 46.62037
## 11467    6.059242e-26 -30.48342 30.48342 -46.62037 46.62037
## 11468    4.671357e-26 -30.48342 30.48342 -46.62037 46.62037
## 11469    3.601370e-26 -30.48342 30.48342 -46.62037 46.62037
## 11470    2.776467e-26 -30.48342 30.48342 -46.62037 46.62037
## 11471    2.140510e-26 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11472   1.650220e-26 -30.48342 30.48342 -46.62037 46.62037
## 11473   1.272233e-26 -30.48342 30.48342 -46.62037 46.62037
## 11474   9.808247e-27 -30.48342 30.48342 -46.62037 46.62037
## 11475   7.561642e-27 -30.48342 30.48342 -46.62037 46.62037
## 11476   5.829628e-27 -30.48342 30.48342 -46.62037 46.62037
## 11477   4.494336e-27 -30.48342 30.48342 -46.62037 46.62037
## 11478   3.464897e-27 -30.48342 30.48342 -46.62037 46.62037
## 11479   2.671253e-27 -30.48342 30.48342 -46.62037 46.62037
## 11480   2.059395e-27 -30.48342 30.48342 -46.62037 46.62037
## 11481   1.587685e-27 -30.48342 30.48342 -46.62037 46.62037
## 11482   1.224022e-27 -30.48342 30.48342 -46.62037 46.62037
## 11483   9.436565e-28 -30.48342 30.48342 -46.62037 46.62037
## 11484   7.275095e-28 -30.48342 30.48342 -46.62037 46.62037
## 11485   5.608715e-28 -30.48342 30.48342 -46.62037 46.62037
## 11486   4.324024e-28 -30.48342 30.48342 -46.62037 46.62037
## 11487   3.333595e-28 -30.48342 30.48342 -46.62037 46.62037
## 11488   2.570026e-28 -30.48342 30.48342 -46.62037 46.62037
## 11489   1.981355e-28 -30.48342 30.48342 -46.62037 46.62037
## 11490   1.527520e-28 -30.48342 30.48342 -46.62037 46.62037
## 11491   1.177638e-28 -30.48342 30.48342 -46.62037 46.62037
## 11492   9.078967e-29 -30.48342 30.48342 -46.62037 46.62037
## 11493   6.999406e-29 -30.48342 30.48342 -46.62037 46.62037
## 11494   5.396173e-29 -30.48342 30.48342 -46.62037 46.62037
## 11495   4.160166e-29 -30.48342 30.48342 -46.62037 46.62037
## 11496   3.207269e-29 -30.48342 30.48342 -46.62037 46.62037
## 11497   2.472635e-29 -30.48342 30.48342 -46.62037 46.62037
## 11498   1.906272e-29 -30.48342 30.48342 -46.62037 46.62037
## 11499   1.469635e-29 -30.48342 30.48342 -46.62037 46.62037
## 11500   1.133011e-29 -30.48342 30.48342 -46.62037 46.62037
## 11501   8.734921e-30 -30.48342 30.48342 -46.62037 46.62037
## 11502   6.734164e-30 -30.48342 30.48342 -46.62037 46.62037
## 11503   5.191686e-30 -30.48342 30.48342 -46.62037 46.62037
## 11504   4.002517e-30 -30.48342 30.48342 -46.62037 46.62037
## 11505   3.085730e-30 -30.48342 30.48342 -46.62037 46.62037
## 11506   2.378935e-30 -30.48342 30.48342 -46.62037 46.62037
## 11507   1.834034e-30 -30.48342 30.48342 -46.62037 46.62037
## 11508   1.413943e-30 -30.48342 30.48342 -46.62037 46.62037
## 11509   1.090076e-30 -30.48342 30.48342 -46.62037 46.62037
## 11510   8.403912e-31 -30.48342 30.48342 -46.62037 46.62037
## 11511   6.478974e-31 -30.48342 30.48342 -46.62037 46.62037
## 11512   4.994948e-31 -30.48342 30.48342 -46.62037 46.62037
## 11513   3.850842e-31 -30.48342 30.48342 -46.62037 46.62037
## 11514   2.968796e-31 -30.48342 30.48342 -46.62037 46.62037
## 11515   2.288786e-31 -30.48342 30.48342 -46.62037 46.62037
## 11516   1.764533e-31 -30.48342 30.48342 -46.62037 46.62037
## 11517   1.360362e-31 -30.48342 30.48342 -46.62037 46.62037
## 11518   1.048768e-31 -30.48342 30.48342 -46.62037 46.62037
## 11519   8.085447e-32 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11520    6.233454e-32 -30.48342 30.48342 -46.62037 46.62037
## 11521    4.805665e-32 -30.48342 30.48342 -46.62037 46.62037
## 11522    3.704914e-32 -30.48342 30.48342 -46.62037 46.62037
## 11523    2.856294e-32 -30.48342 30.48342 -46.62037 46.62037
## 11524    2.202052e-32 -30.48342 30.48342 -46.62037 46.62037
## 11525    1.697666e-32 -30.48342 30.48342 -46.62037 46.62037
## 11526    1.308811e-32 -30.48342 30.48342 -46.62037 46.62037
## 11527    1.009025e-32 -30.48342 30.48342 -46.62037 46.62037
## 11528    7.779049e-33 -30.48342 30.48342 -46.62037 46.62037
## 11529    5.997238e-33 -30.48342 30.48342 -46.62037 46.62037
## 11530    4.623554e-33 -30.48342 30.48342 -46.62037 46.62037
## 11531    3.564517e-33 -30.48342 30.48342 -46.62037 46.62037
## 11532    2.748055e-33 -30.48342 30.48342 -46.62037 46.62037
## 11533    2.118606e-33 -30.48342 30.48342 -46.62037 46.62037
## 11534    1.633334e-33 -30.48342 30.48342 -46.62037 46.62037
## 11535    1.259214e-33 -30.48342 30.48342 -46.62037 46.62037
## 11536    9.707878e-34 -30.48342 30.48342 -46.62037 46.62037
## 11537    7.484263e-34 -30.48342 30.48342 -46.62037 46.62037
## 11538    5.769973e-34 -30.48342 30.48342 -46.62037 46.62037
## 11539    4.448345e-34 -30.48342 30.48342 -46.62037 46.62037
## 11540    3.429440e-34 -30.48342 30.48342 -46.62037 46.62037
## 11541    2.643918e-34 -30.48342 30.48342 -46.62037 46.62037
## 11542    2.038321e-34 -30.48342 30.48342 -46.62037 46.62037
## 11543    1.571439e-34 -30.48342 30.48342 -46.62037 46.62037
## 11544    1.211496e-34 -30.48342 30.48342 -46.62037 46.62037
## 11545    9.339999e-35 -30.48342 30.48342 -46.62037 46.62037
## 11546    7.200648e-35 -30.48342 30.48342 -46.62037 46.62037
## 11547    5.551320e-35 -30.48342 30.48342 -46.62037 46.62037
## 11548    4.279776e-35 -30.48342 30.48342 -46.62037 46.62037
## 11549    3.299482e-35 -30.48342 30.48342 -46.62037 46.62037
## 11550    2.543727e-35 -30.48342 30.48342 -46.62037 46.62037
## 11551    1.961079e-35 -30.48342 30.48342 -46.62037 46.62037
## 11552    1.511889e-35 -30.48342 30.48342 -46.62037 46.62037
## 11553    1.165587e-35 -30.48342 30.48342 -46.62037 46.62037
## 11554    8.986061e-36 -30.48342 30.48342 -46.62037 46.62037
## 11555    6.927780e-36 -30.48342 30.48342 -46.62037 46.62037
## 11556    5.340954e-36 -30.48342 30.48342 -46.62037 46.62037
## 11557    4.117594e-36 -30.48342 30.48342 -46.62037 46.62037
## 11558    3.174448e-36 -30.48342 30.48342 -46.62037 46.62037
## 11559    2.447333e-36 -30.48342 30.48342 -46.62037 46.62037
## 11560    1.886765e-36 -30.48342 30.48342 -46.62037 46.62037
## 11561    1.454596e-36 -30.48342 30.48342 -46.62037 46.62037
## 11562    1.121417e-36 -30.48342 30.48342 -46.62037 46.62037
## 11563    8.645535e-37 -30.48342 30.48342 -46.62037 46.62037
## 11564    6.665253e-37 -30.48342 30.48342 -46.62037 46.62037
## 11565    5.138559e-37 -30.48342 30.48342 -46.62037 46.62037
## 11566    3.961558e-37 -30.48342 30.48342 -46.62037 46.62037
## 11567    3.054153e-37 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11568    2.354591e-37 -30.48342 30.48342 -46.62037 46.62037
## 11569    1.815266e-37 -30.48342 30.48342 -46.62037 46.62037
## 11570    1.399474e-37 -30.48342 30.48342 -46.62037 46.62037
## 11571    1.078921e-37 -30.48342 30.48342 -46.62037 46.62037
## 11572    8.317914e-38 -30.48342 30.48342 -46.62037 46.62037
## 11573    6.412674e-38 -30.48342 30.48342 -46.62037 46.62037
## 11574    4.943834e-38 -30.48342 30.48342 -46.62037 46.62037
## 11575    3.811436e-38 -30.48342 30.48342 -46.62037 46.62037
## 11576    2.938416e-38 -30.48342 30.48342 -46.62037 46.62037
## 11577    2.265364e-38 -30.48342 30.48342 -46.62037 46.62037
## 11578    1.746477e-38 -30.48342 30.48342 -46.62037 46.62037
## 11579    1.346441e-38 -30.48342 30.48342 -46.62037 46.62037
## 11580    1.038036e-38 -30.48342 30.48342 -46.62037 46.62037
## 11581    8.002707e-39 -30.48342 30.48342 -46.62037 46.62037
## 11582    6.169666e-39 -30.48342 30.48342 -46.62037 46.62037
## 11583    4.756488e-39 -30.48342 30.48342 -46.62037 46.62037
## 11584    3.667002e-39 -30.48342 30.48342 -46.62037 46.62037
## 11585    2.827065e-39 -30.48342 30.48342 -46.62037 46.62037
## 11586    2.179518e-39 -30.48342 30.48342 -46.62037 46.62037
## 11587    1.680294e-39 -30.48342 30.48342 -46.62037 46.62037
## 11588    1.295418e-39 -30.48342 30.48342 -46.62037 46.62037
## 11589    9.986993e-40 -30.48342 30.48342 -46.62037 46.62037
## 11590    7.699446e-40 -30.48342 30.48342 -46.62037 46.62037
## 11591    5.935867e-40 -30.48342 30.48342 -46.62037 46.62037
## 11592    4.576241e-40 -30.48342 30.48342 -46.62037 46.62037
## 11593    3.528041e-40 -30.48342 30.48342 -46.62037 46.62037
## 11594    2.719934e-40 -30.48342 30.48342 -46.62037 46.62037
## 11595    2.096926e-40 -30.48342 30.48342 -46.62037 46.62037
## 11596    1.616619e-40 -30.48342 30.48342 -46.62037 46.62037
## 11597    1.246329e-40 -30.48342 30.48342 -46.62037 46.62037
## 11598    9.608537e-41 -30.48342 30.48342 -46.62037 46.62037
## 11599    7.407676e-41 -30.48342 30.48342 -46.62037 46.62037
## 11600    5.710928e-41 -30.48342 30.48342 -46.62037 46.62037
## 11601    4.402825e-41 -30.48342 30.48342 -46.62037 46.62037
## 11602    3.394346e-41 -30.48342 30.48342 -46.62037 46.62037
## 11603    2.616862e-41 -30.48342 30.48342 -46.62037 46.62037
## 11604    2.017463e-41 -30.48342 30.48342 -46.62037 46.62037
## 11605    1.555358e-41 -30.48342 30.48342 -46.62037 46.62037
## 11606    1.199099e-41 -30.48342 30.48342 -46.62037 46.62037
## 11607    9.244422e-42 -30.48342 30.48342 -46.62037 46.62037
## 11608    7.126963e-42 -30.48342 30.48342 -46.62037 46.62037
## 11609    5.494513e-42 -30.48342 30.48342 -46.62037 46.62037
## 11610    4.235980e-42 -30.48342 30.48342 -46.62037 46.62037
## 11611    3.265718e-42 -30.48342 30.48342 -46.62037 46.62037
## 11612    2.517697e-42 -30.48342 30.48342 -46.62037 46.62037
## 11613    1.941012e-42 -30.48342 30.48342 -46.62037 46.62037
## 11614    1.496418e-42 -30.48342 30.48342 -46.62037 46.62037
## 11615    1.153659e-42 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11616    8.894106e-43 -30.48342 30.48342 -46.62037 46.62037
## 11617    6.856887e-43 -30.48342 30.48342 -46.62037 46.62037
## 11618    5.286299e-43 -30.48342 30.48342 -46.62037 46.62037
## 11619    4.075458e-43 -30.48342 30.48342 -46.62037 46.62037
## 11620    3.141964e-43 -30.48342 30.48342 -46.62037 46.62037
## 11621    2.422289e-43 -30.48342 30.48342 -46.62037 46.62037
## 11622    1.867457e-43 -30.48342 30.48342 -46.62037 46.62037
## 11623    1.439711e-43 -30.48342 30.48342 -46.62037 46.62037
## 11624    1.109942e-43 -30.48342 30.48342 -46.62037 46.62037
## 11625    8.557065e-44 -30.48342 30.48342 -46.62037 46.62037
## 11626    6.597046e-44 -30.48342 30.48342 -46.62037 46.62037
## 11627    5.085976e-44 -30.48342 30.48342 -46.62037 46.62037
## 11628    3.921019e-44 -30.48342 30.48342 -46.62037 46.62037
## 11629    3.022900e-44 -30.48342 30.48342 -46.62037 46.62037
## 11630    2.330496e-44 -30.48342 30.48342 -46.62037 46.62037
## 11631    1.796690e-44 -30.48342 30.48342 -46.62037 46.62037
## 11632    1.385153e-44 -30.48342 30.48342 -46.62037 46.62037
## 11633    1.067880e-44 -30.48342 30.48342 -46.62037 46.62037
## 11634    8.232796e-45 -30.48342 30.48342 -46.62037 46.62037
## 11635    6.347052e-45 -30.48342 30.48342 -46.62037 46.62037
## 11636    4.893243e-45 -30.48342 30.48342 -46.62037 46.62037
## 11637    3.772433e-45 -30.48342 30.48342 -46.62037 46.62037
## 11638    2.908347e-45 -30.48342 30.48342 -46.62037 46.62037
## 11639    2.242183e-45 -30.48342 30.48342 -46.62037 46.62037
## 11640    1.728605e-45 -30.48342 30.48342 -46.62037 46.62037
## 11641    1.332663e-45 -30.48342 30.48342 -46.62037 46.62037
## 11642    1.027413e-45 -30.48342 30.48342 -46.62037 46.62037
## 11643    7.920815e-46 -30.48342 30.48342 -46.62037 46.62037
## 11644    6.106531e-46 -30.48342 30.48342 -46.62037 46.62037
## 11645    4.707814e-46 -30.48342 30.48342 -46.62037 46.62037
## 11646    3.629477e-46 -30.48342 30.48342 -46.62037 46.62037
## 11647    2.798136e-46 -30.48342 30.48342 -46.62037 46.62037
## 11648    2.157215e-46 -30.48342 30.48342 -46.62037 46.62037
## 11649    1.663099e-46 -30.48342 30.48342 -46.62037 46.62037
## 11650    1.282162e-46 -30.48342 30.48342 -46.62037 46.62037
## 11651    9.884795e-47 -30.48342 30.48342 -46.62037 46.62037
## 11652    7.620656e-47 -30.48342 30.48342 -46.62037 46.62037
## 11653    5.875125e-47 -30.48342 30.48342 -46.62037 46.62037
## 11654    4.529412e-47 -30.48342 30.48342 -46.62037 46.62037
## 11655    3.491938e-47 -30.48342 30.48342 -46.62037 46.62037
## 11656    2.692101e-47 -30.48342 30.48342 -46.62037 46.62037
## 11657    2.075468e-47 -30.48342 30.48342 -46.62037 46.62037
## 11658    1.600076e-47 -30.48342 30.48342 -46.62037 46.62037
## 11659    1.233575e-47 -30.48342 30.48342 -46.62037 46.62037
## 11660    9.510212e-48 -30.48342 30.48342 -46.62037 46.62037
## 11661    7.331873e-48 -30.48342 30.48342 -46.62037 46.62037
## 11662    5.652488e-48 -30.48342 30.48342 -46.62037 46.62037
## 11663    4.357770e-48 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11664    3.359612e-48 -30.48342 30.48342 -46.62037 46.62037
## 11665    2.590084e-48 -30.48342 30.48342 -46.62037 46.62037
## 11666    1.996818e-48 -30.48342 30.48342 -46.62037 46.62037
## 11667    1.539442e-48 -30.48342 30.48342 -46.62037 46.62037
## 11668    1.186829e-48 -30.48342 30.48342 -46.62037 46.62037
## 11669    9.149823e-49 -30.48342 30.48342 -46.62037 46.62037
## 11670    7.054032e-49 -30.48342 30.48342 -46.62037 46.62037
## 11671    5.438287e-49 -30.48342 30.48342 -46.62037 46.62037
## 11672    4.192633e-49 -30.48342 30.48342 -46.62037 46.62037
## 11673    3.232300e-49 -30.48342 30.48342 -46.62037 46.62037
## 11674    2.491933e-49 -30.48342 30.48342 -46.62037 46.62037
## 11675    1.921149e-49 -30.48342 30.48342 -46.62037 46.62037
## 11676    1.481105e-49 -30.48342 30.48342 -46.62037 46.62037
## 11677    1.141854e-49 -30.48342 30.48342 -46.62037 46.62037
## 11678    8.803092e-50 -30.48342 30.48342 -46.62037 46.62037
## 11679    6.786720e-50 -30.48342 30.48342 -46.62037 46.62037
## 11680    5.232204e-50 -30.48342 30.48342 -46.62037 46.62037
## 11681    4.033754e-50 -30.48342 30.48342 -46.62037 46.62037
## 11682    3.109812e-50 -30.48342 30.48342 -46.62037 46.62037
## 11683    2.397501e-50 -30.48342 30.48342 -46.62037 46.62037
## 11684    1.848347e-50 -30.48342 30.48342 -46.62037 46.62037
## 11685    1.424978e-50 -30.48342 30.48342 -46.62037 46.62037
## 11686    1.098583e-50 -30.48342 30.48342 -46.62037 46.62037
## 11687    8.469499e-51 -30.48342 30.48342 -46.62037 46.62037
## 11688    6.529538e-51 -30.48342 30.48342 -46.62037 46.62037
## 11689    5.033930e-51 -30.48342 30.48342 -46.62037 46.62037
## 11690    3.880895e-51 -30.48342 30.48342 -46.62037 46.62037
## 11691    2.991966e-51 -30.48342 30.48342 -46.62037 46.62037
## 11692    2.306648e-51 -30.48342 30.48342 -46.62037 46.62037
## 11693    1.778304e-51 -30.48342 30.48342 -46.62037 46.62037
## 11694    1.370979e-51 -30.48342 30.48342 -46.62037 46.62037
## 11695    1.056953e-51 -30.48342 30.48342 -46.62037 46.62037
## 11696    8.148549e-52 -30.48342 30.48342 -46.62037 46.62037
## 11697    6.282102e-52 -30.48342 30.48342 -46.62037 46.62037
## 11698    4.843170e-52 -30.48342 30.48342 -46.62037 46.62037
## 11699    3.733829e-52 -30.48342 30.48342 -46.62037 46.62037
## 11700    2.878586e-52 -30.48342 30.48342 -46.62037 46.62037
## 11701    2.219238e-52 -30.48342 30.48342 -46.62037 46.62037
## 11702    1.710916e-52 -30.48342 30.48342 -46.62037 46.62037
## 11703    1.319026e-52 -30.48342 30.48342 -46.62037 46.62037
## 11704    1.016900e-52 -30.48342 30.48342 -46.62037 46.62037
## 11705    7.839760e-53 -30.48342 30.48342 -46.62037 46.62037
## 11706    6.044043e-53 -30.48342 30.48342 -46.62037 46.62037
## 11707    4.659639e-53 -30.48342 30.48342 -46.62037 46.62037
## 11708    3.592336e-53 -30.48342 30.48342 -46.62037 46.62037
## 11709    2.769502e-53 -30.48342 30.48342 -46.62037 46.62037
## 11710    2.135140e-53 -30.48342 30.48342 -46.62037 46.62037
## 11711    1.646081e-53 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11712    1.269042e-53 -30.48342 30.48342 -46.62037 46.62037
## 11713    9.783643e-54 -30.48342 30.48342 -46.62037 46.62037
## 11714    7.542674e-54 -30.48342 30.48342 -46.62037 46.62037
## 11715    5.815004e-54 -30.48342 30.48342 -46.62037 46.62037
## 11716    4.483062e-54 -30.48342 30.48342 -46.62037 46.62037
## 11717    3.456205e-54 -30.48342 30.48342 -46.62037 46.62037
## 11718    2.664552e-54 -30.48342 30.48342 -46.62037 46.62037
## 11719    2.054229e-54 -30.48342 30.48342 -46.62037 46.62037
## 11720    1.583703e-54 -30.48342 30.48342 -46.62037 46.62037
## 11721    1.220951e-54 -30.48342 30.48342 -46.62037 46.62037
## 11722    9.412893e-55 -30.48342 30.48342 -46.62037 46.62037
## 11723    7.256845e-55 -30.48342 30.48342 -46.62037 46.62037
## 11724    5.594645e-55 -30.48342 30.48342 -46.62037 46.62037
## 11725    4.313177e-55 -30.48342 30.48342 -46.62037 46.62037
## 11726    3.325232e-55 -30.48342 30.48342 -46.62037 46.62037
## 11727    2.563579e-55 -30.48342 30.48342 -46.62037 46.62037
## 11728    1.976385e-55 -30.48342 30.48342 -46.62037 46.62037
## 11729    1.523688e-55 -30.48342 30.48342 -46.62037 46.62037
## 11730    1.174684e-55 -30.48342 30.48342 -46.62037 46.62037
## 11731    9.056192e-56 -30.48342 30.48342 -46.62037 46.62037
## 11732    6.981847e-56 -30.48342 30.48342 -46.62037 46.62037
## 11733    5.382637e-56 -30.48342 30.48342 -46.62037 46.62037
## 11734    4.149730e-56 -30.48342 30.48342 -46.62037 46.62037
## 11735    3.199223e-56 -30.48342 30.48342 -46.62037 46.62037
## 11736    2.466433e-56 -30.48342 30.48342 -46.62037 46.62037
## 11737    1.901490e-56 -30.48342 30.48342 -46.62037 46.62037
## 11738    1.465948e-56 -30.48342 30.48342 -46.62037 46.62037
## 11739    1.130169e-56 -30.48342 30.48342 -46.62037 46.62037
## 11740    8.713009e-57 -30.48342 30.48342 -46.62037 46.62037
## 11741    6.717271e-57 -30.48342 30.48342 -46.62037 46.62037
## 11742    5.178662e-57 -30.48342 30.48342 -46.62037 46.62037
## 11743    3.992476e-57 -30.48342 30.48342 -46.62037 46.62037
## 11744    3.077989e-57 -30.48342 30.48342 -46.62037 46.62037
## 11745    2.372967e-57 -30.48342 30.48342 -46.62037 46.62037
## 11746    1.829433e-57 -30.48342 30.48342 -46.62037 46.62037
## 11747    1.410397e-57 -30.48342 30.48342 -46.62037 46.62037
## 11748    1.087341e-57 -30.48342 30.48342 -46.62037 46.62037
## 11749    8.382830e-58 -30.48342 30.48342 -46.62037 46.62037
## 11750    6.462721e-58 -30.48342 30.48342 -46.62037 46.62037
## 11751    4.982418e-58 -30.48342 30.48342 -46.62037 46.62037
## 11752    3.841182e-58 -30.48342 30.48342 -46.62037 46.62037
## 11753    2.961349e-58 -30.48342 30.48342 -46.62037 46.62037
## 11754    2.283044e-58 -30.48342 30.48342 -46.62037 46.62037
## 11755    1.760107e-58 -30.48342 30.48342 -46.62037 46.62037
## 11756    1.356950e-58 -30.48342 30.48342 -46.62037 46.62037
## 11757    1.046137e-58 -30.48342 30.48342 -46.62037 46.62037
## 11758    8.065164e-59 -30.48342 30.48342 -46.62037 46.62037
## 11759    6.217817e-59 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11760    4.793609e-59  -30.48342  30.48342  -46.62037  46.62037
## 11761    3.695620e-59  -30.48342  30.48342  -46.62037  46.62037
## 11762    2.849129e-59  -30.48342  30.48342  -46.62037  46.62037
## 11763    2.196528e-59  -30.48342  30.48342  -46.62037  46.62037
## 11764    1.693408e-59  -30.48342  30.48342  -46.62037  46.62037
## 11765    1.305528e-59  -30.48342  30.48342  -46.62037  46.62037
## 11766    1.006494e-59  -30.48342  30.48342  -46.62037  46.62037
## 11767    7.759535e-60  -30.48342  30.48342  -46.62037  46.62037
## 11768    5.982193e-60  -30.48342  30.48342  -46.62037  46.62037
## 11769    4.611956e-60  -30.48342  30.48342  -46.62037  46.62037
## 11770    3.555575e-60  -30.48342  30.48342  -46.62037  46.62037
## 11771    2.741161e-60  -30.48342  30.48342  -46.62037  46.62037
## 11772    2.113291e-60  -30.48342  30.48342  -46.62037  46.62037
## 11773    1.629236e-60  -30.48342  30.48342  -46.62037  46.62037
## 11774    1.256055e-60  -30.48342  30.48342  -46.62037  46.62037
## 11775    9.683526e-61  -30.48342  30.48342  -46.62037  46.62037
## 11776    7.465489e-61  -30.48342  30.48342  -46.62037  46.62037
## 11777    5.755499e-61  -30.48342  30.48342  -46.62037  46.62037
## 11778    4.437187e-61  -30.48342  30.48342  -46.62037  46.62037
## 11779    3.420837e-61  -30.48342  30.48342  -46.62037  46.62037
## 11780    2.637285e-61  -30.48342  30.48342  -46.62037  46.62037
## 11781    2.033208e-61  -30.48342  30.48342  -46.62037  46.62037
## 11782    1.567497e-61  -30.48342  30.48342  -46.62037  46.62037
## 11783    1.208457e-61  -30.48342  30.48342  -46.62037  46.62037
## 11784    9.316570e-62  -30.48342  30.48342  -46.62037  46.62037
## 11785    7.182585e-62  -30.48342  30.48342  -46.62037  46.62037
## 11786    5.537395e-62  -30.48342  30.48342  -46.62037  46.62037
## 11787    4.269040e-62  -30.48342  30.48342  -46.62037  46.62037
## 11788    3.291205e-62  -30.48342  30.48342  -46.62037  46.62037
## 11789    2.537346e-62  -30.48342  30.48342  -46.62037  46.62037
## 11790    1.956160e-62  -30.48342  30.48342  -46.62037  46.62037
## 11791    1.508096e-62  -30.48342  30.48342  -46.62037  46.62037
## 11792    1.162663e-62  -30.48342  30.48342  -46.62037  46.62037
## 11793    8.963519e-63  -30.48342  30.48342  -46.62037  46.62037
## 11794    6.910401e-63  -30.48342  30.48342  -46.62037  46.62037
## 11795    5.327556e-63  -30.48342  30.48342  -46.62037  46.62037
## 11796    4.107265e-63  -30.48342  30.48342  -46.62037  46.62037
## 11797    3.166485e-63  -30.48342  30.48342  -46.62037  46.62037
## 11798    2.441193e-63  -30.48342  30.48342  -46.62037  46.62037
## 11799    1.882032e-63  -30.48342  30.48342  -46.62037  46.62037
## 11800    1.450947e-63  -30.48342  30.48342  -46.62037  46.62037
## 11801    1.118604e-63  -30.48342  30.48342  -46.62037  46.62037
## 11802    8.623848e-64  -30.48342  30.48342  -46.62037  46.62037
## 11803    6.648533e-64  -30.48342  30.48342  -46.62037  46.62037
## 11804    5.125669e-64  -30.48342  30.48342  -46.62037  46.62037
## 11805    3.951621e-64  -30.48342  30.48342  -46.62037  46.62037
## 11806    3.046492e-64  -30.48342  30.48342  -46.62037  46.62037
## 11807    2.348685e-64  -30.48342  30.48342  -46.62037  46.62037
```

```
## 11808    1.810712e-64 -30.48342 30.48342 -46.62037 46.62037
## 11809    1.395964e-64 -30.48342 30.48342 -46.62037 46.62037
## 11810    1.076215e-64 -30.48342 30.48342 -46.62037 46.62037
## 11811    8.297048e-65 -30.48342 30.48342 -46.62037 46.62037
## 11812    6.396587e-65 -30.48342 30.48342 -46.62037 46.62037
## 11813    4.931432e-65 -30.48342 30.48342 -46.62037 46.62037
## 11814    3.801874e-65 -30.48342 30.48342 -46.62037 46.62037
## 11815    2.931045e-65 -30.48342 30.48342 -46.62037 46.62037
## 11816    2.259681e-65 -30.48342 30.48342 -46.62037 46.62037
## 11817    1.742095e-65 -30.48342 30.48342 -46.62037 46.62037
## 11818    1.343064e-65 -30.48342 30.48342 -46.62037 46.62037
## 11819    1.035432e-65 -30.48342 30.48342 -46.62037 46.62037
## 11820    7.982632e-66 -30.48342 30.48342 -46.62037 46.62037
## 11821    6.154189e-66 -30.48342 30.48342 -46.62037 46.62037
## 11822    4.744556e-66 -30.48342 30.48342 -46.62037 46.62037
## 11823    3.657803e-66 -30.48342 30.48342 -46.62037 46.62037
## 11824    2.819973e-66 -30.48342 30.48342 -46.62037 46.62037
## 11825    2.174051e-66 -30.48342 30.48342 -46.62037 46.62037
## 11826    1.676079e-66 -30.48342 30.48342 -46.62037 46.62037
## 11827    1.292169e-66 -30.48342 30.48342 -46.62037 46.62037
## 11828    9.961940e-67 -30.48342 30.48342 -46.62037 46.62037
## 11829    7.680131e-67 -30.48342 30.48342 -46.62037 46.62037
## 11830    5.920977e-67 -30.48342 30.48342 -46.62037 46.62037
## 11831    4.564761e-67 -30.48342 30.48342 -46.62037 46.62037
## 11832    3.519191e-67 -30.48342 30.48342 -46.62037 46.62037
## 11833    2.713111e-67 -30.48342 30.48342 -46.62037 46.62037
## 11834    2.091666e-67 -30.48342 30.48342 -46.62037 46.62037
## 11835    1.612564e-67 -30.48342 30.48342 -46.62037 46.62037
## 11836    1.243202e-67 -30.48342 30.48342 -46.62037 46.62037
## 11837    9.584433e-68 -30.48342 30.48342 -46.62037 46.62037
## 11838    7.389094e-68 -30.48342 30.48342 -46.62037 46.62037
## 11839    5.696602e-68 -30.48342 30.48342 -46.62037 46.62037
## 11840    4.391780e-68 -30.48342 30.48342 -46.62037 46.62037
## 11841    3.385831e-68 -30.48342 30.48342 -46.62037 46.62037
## 11842    2.610298e-68 -30.48342 30.48342 -46.62037 46.62037
## 11843    2.012402e-68 -30.48342 30.48342 -46.62037 46.62037
## 11844    1.551456e-68 -30.48342 30.48342 -46.62037 46.62037
## 11845    1.196091e-68 -30.48342 30.48342 -46.62037 46.62037
## 11846    9.221232e-69 -30.48342 30.48342 -46.62037 46.62037
## 11847    7.109085e-69 -30.48342 30.48342 -46.62037 46.62037
## 11848    5.480730e-69 -30.48342 30.48342 -46.62037 46.62037
## 11849    4.225354e-69 -30.48342 30.48342 -46.62037 46.62037
## 11850    3.257526e-69 -30.48342 30.48342 -46.62037 46.62037
## 11851    2.511381e-69 -30.48342 30.48342 -46.62037 46.62037
## 11852    1.936142e-69 -30.48342 30.48342 -46.62037 46.62037
## 11853    1.492664e-69 -30.48342 30.48342 -46.62037 46.62037
## 11854    1.150765e-69 -30.48342 30.48342 -46.62037 46.62037
## 11855    8.871795e-70 -30.48342 30.48342 -46.62037 46.62037
```

```
## 11856    6.839687e-70  -30.48342  30.48342  -46.62037  46.62037
## 11857    5.273038e-70  -30.48342  30.48342  -46.62037  46.62037
## 11858    4.065235e-70  -30.48342  30.48342  -46.62037  46.62037
## 11859    3.134082e-70  -30.48342  30.48342  -46.62037  46.62037
## 11860    2.416212e-70  -30.48342  30.48342  -46.62037  46.62037
## 11861    1.862773e-70  -30.48342  30.48342  -46.62037  46.62037
## 11862    1.436100e-70  -30.48342  30.48342  -46.62037  46.62037
## 11863    1.107157e-70  -30.48342  30.48342  -46.62037  46.62037
## 11864    8.535599e-71  -30.48342  30.48342  -46.62037  46.62037
## 11865    6.580497e-71  -30.48342  30.48342  -46.62037  46.62037
## 11866    5.073217e-71  -30.48342  30.48342  -46.62037  46.62037
## 11867    3.911183e-71  -30.48342  30.48342  -46.62037  46.62037
## 11868    3.015316e-71  -30.48342  30.48342  -46.62037  46.62037
## 11869    2.324650e-71  -30.48342  30.48342  -46.62037  46.62037
## 11870    1.792183e-71  -30.48342  30.48342  -46.62037  46.62037
## 11871    1.381679e-71  -30.48342  30.48342  -46.62037  46.62037
## 11872    1.065202e-71  -30.48342  30.48342  -46.62037  46.62037
## 11873    8.212143e-72  -30.48342  30.48342  -46.62037  46.62037
## 11874    6.331130e-72  -30.48342  30.48342  -46.62037  46.62037
## 11875    4.880968e-72  -30.48342  30.48342  -46.62037  46.62037
## 11876    3.762969e-72  -30.48342  30.48342  -46.62037  46.62037
## 11877    2.901051e-72  -30.48342  30.48342  -46.62037  46.62037
## 11878    2.236558e-72  -30.48342  30.48342  -46.62037  46.62037
## 11879    1.724268e-72  -30.48342  30.48342  -46.62037  46.62037
## 11880    1.329320e-72  -30.48342  30.48342  -46.62037  46.62037
## 11881    1.024836e-72  -30.48342  30.48342  -46.62037  46.62037
## 11882    7.900945e-73  -30.48342  30.48342  -46.62037  46.62037
## 11883    6.091213e-73  -30.48342  30.48342  -46.62037  46.62037
## 11884    4.696004e-73  -30.48342  30.48342  -46.62037  46.62037
## 11885    3.620372e-73  -30.48342  30.48342  -46.62037  46.62037
## 11886    2.791116e-73  -30.48342  30.48342  -46.62037  46.62037
## 11887    2.151804e-73  -30.48342  30.48342  -46.62037  46.62037
## 11888    1.658927e-73  -30.48342  30.48342  -46.62037  46.62037
## 11889    1.278946e-73  -30.48342  30.48342  -46.62037  46.62037
## 11890    9.859998e-74  -30.48342  30.48342  -46.62037  46.62037
## 11891    7.601540e-74  -30.48342  30.48342  -46.62037  46.62037
## 11892    5.860387e-74  -30.48342  30.48342  -46.62037  46.62037
## 11893    4.518050e-74  -30.48342  30.48342  -46.62037  46.62037
## 11894    3.483179e-74  -30.48342  30.48342  -46.62037  46.62037
## 11895    2.685347e-74  -30.48342  30.48342  -46.62037  46.62037
## 11896    2.070261e-74  -30.48342  30.48342  -46.62037  46.62037
## 11897    1.596063e-74  -30.48342  30.48342  -46.62037  46.62037
## 11898    1.230480e-74  -30.48342  30.48342  -46.62037  46.62037
## 11899    9.486355e-75  -30.48342  30.48342  -46.62037  46.62037
## 11900    7.313480e-75  -30.48342  30.48342  -46.62037  46.62037
## 11901    5.638308e-75  -30.48342  30.48342  -46.62037  46.62037
## 11902    4.346839e-75  -30.48342  30.48342  -46.62037  46.62037
```

```
## 11903    3.351184e-75 -30.48342 30.48342 -46.62037 46.62037
## 11904    2.583586e-75 -30.48342 30.48342 -46.62037 46.62037
```

Arima forecasts. Note that here the model does not predict the actual utilizations but their difference previous 72 hour values.

Test dates are selected which are between 01-05-22 and 24-05-22 and the predictions are recorded.

Code

Code

```
##             date hour CLOUD_LOW_LAYER_36.25_33 CLOUD_LOW_LAYER_36.25_33.25
##  1: 2021-02-01    0                         45                           31
##  2: 2021-02-01    1                         44                           26
##  3: 2021-02-01    2                         37                           35
##  4: 2021-02-01    3                         43                           45
##  5: 2021-02-01    4                         72                           95
##  6: 2021-02-01    5                         69                           95
##  7: 2021-02-01    6                         75                           96
##  8: 2021-02-01    7                         79                           97
##  9: 2021-02-01    8                         83                           97
## 10: 2021-02-01    9                         86                           97
## 11: 2021-02-01   10                        100                          100
## 12: 2021-02-01   11                        100                          100
## 13: 2021-02-01   12                         98                          100
## 14: 2021-02-01   13                         97                          100
## 15: 2021-02-01   14                         97                          100
## 16: 2021-02-01   15                         93                           98
## 17: 2021-02-01   16                         82                           46
## 18: 2021-02-01   17                         58                           33
## 19: 2021-02-01   18                         42                           23
## 20: 2021-02-01   19                         32                           17
## 21: 2021-02-01   20                         25                           14
## 22: 2021-02-01   21                         21                           11
## 23: 2021-02-01   22                          0                            0
## 24: 2021-02-01   23                          0                            0
##             date hour CLOUD_LOW_LAYER_36.25_33 CLOUD_LOW_LAYER_36.25_33.25
##      CLOUD_LOW_LAYER_36.25_33.5 CLOUD_LOW_LAYER_36.5_33
##  1:                          3                      53
##  2:                         19                      64
##  3:                         35                      60
##  4:                         46                      51
##  5:                         46                      16
##  6:                         31                      24
##  7:                         53                      21
##  8:                         65                      16
##  9:                         60                      13
## 10:                         67                      20
## 11:                         60                      79
## 12:                         59                      71
## 13:                         71                      65
## 14:                         69                      73
## 15:                         67                      73
## 16:                         71                      77
## 17:                          6                      90
## 18:                          3                      94
## 19:                          2                      73
## 20:                          1                      60
## 21:                          1                      49
```

```
## 22:                               1                      41
## 23:                               0                       0
## 24:                               0                       0
##      CLOUD_LOW_LAYER_36.25_33.5 CLOUD_LOW_LAYER_36.5_33
##      CLOUD_LOW_LAYER_36.5_33.25 CLOUD_LOW_LAYER_36.5_33.5
##  1:                            10                       0
##  2:                            21                       0
##  3:                            19                       0
##  4:                            24                       8
##  5:                            57                       1
##  6:                            68                       2
##  7:                            63                      14
##  8:                            72                      36
##  9:                            78                      46
## 10:                            78                      43
## 11:                            95                       7
## 12:                            96                       8
## 13:                            98                      10
## 14:                            98                      11
## 15:                            94                      14
## 16:                            91                      23
## 17:                            84                      56
## 18:                            65                      28
## 19:                            47                      19
## 20:                            35                      14
## 21:                            28                      12
## 22:                            24                       9
## 23:                             0                       0
## 24:                             0                       0
##      CLOUD_LOW_LAYER_36.5_33.25 CLOUD_LOW_LAYER_36.5_33.5
##      CLOUD_LOW_LAYER_36.75_33 CLOUD_LOW_LAYER_36.75_33.25
##  1:                            92                      26
##  2:                            93                      31
##  3:                            92                      35
##  4:                            91                      36
##  5:                            86                      40
##  6:                            86                      56
##  7:                            86                      64
##  8:                            87                      69
##  9:                            87                      75
## 10:                            87                      78
## 11:                            82                      68
## 12:                            84                      75
## 13:                            86                      78
## 14:                            88                      82
## 15:                            90                      83
## 16:                            90                      85
## 17:                           100                      91
```

```
## 18:                          100                          65
## 19:                           96                          47
## 20:                           92                          38
## 21:                           92                          32
## 22:                           91                          28
## 23:                           82                           0
## 24:                           79                           0
##      CLOUD_LOW_LAYER_36.75_33 CLOUD_LOW_LAYER_36.75_33.25
##      CLOUD_LOW_LAYER_36.75_33.5 DSWRF_36.25_33 DSWRF_36.25_33.25
##  1:                           0              0                 0
##  2:                           0              0                 0
##  3:                           1              0                 0
##  4:                           9              0                 0
##  5:                          36              0                 0
##  6:                          50              0                 0
##  7:                          63              0                 0
##  8:                          72              0                 0
##  9:                          77              0                 0
## 10:                          77              3                 2
## 11:                          15             50                40
## 12:                          25             80                70
## 13:                          34            140                90
## 14:                          48            180               100
## 15:                          55            190               130
## 16:                          62            230               160
## 17:                         100            290               350
## 18:                          92            270               290
## 19:                          91            200               220
## 20:                          83            150               170
## 21:                          72            120               130
## 22:                          61            100               110
## 23:                           0              0                 0
## 24:                           0              0                 0
##      CLOUD_LOW_LAYER_36.75_33.5 DSWRF_36.25_33 DSWRF_36.25_33.25
##      DSWRF_36.25_33.5 DSWRF_36.5_33 DSWRF_36.5_33.25 DSWRF_36.5_33.5
##  1:                 0             0                0               0
##  2:                 0             0                0               0
##  3:                 0             0                0               0
##  4:                 0             0                0               0
##  5:                 0             0                0               0
##  6:                 0             0                0               0
##  7:                 0             0                0               0
##  8:                 0             0                0               0
##  9:                 0             0                0               0
## 10:                 3            10                9              10
## 11:               180           150               90             220
## 12:               250           240              140             300
## 13:               250           310              170             360
```

```
## 14:            300          320          160          390
## 15:            340          360          210          410
## 16:            330          360          240          420
## 17:            410          210          230          300
## 18:            330          170          230          270
## 19:            240          140          180          200
## 20:            180          100          130          160
## 21:            150           80          110          130
## 22:            120           60           90          110
## 23:              0            0            0            0
## 24:              0            0            0            0
##      DSWRF_36.25_33.5 DSWRF_36.5_33 DSWRF_36.5_33.25 DSWRF_36.5_33.5
##      DSWRF_36.75_33 DSWRF_36.75_33.25 DSWRF_36.75_33.5 REL_HUMIDITY_36.25
_33
##   1:               0            0            0                  9
1.8
##   2:               0            0            0                  9
0.2
##   3:               0            0            0                  8
8.8
##   4:               0            0            0                  8
4.6
##   5:               0            0            0                  8
5.5
##   6:               0            0            0                  8
8.2
##   7:               0            0            0                  8
7.3
##   8:               0            0            0                  8
7.2
##   9:               0            0            0                  8
7.7
## 10:               8            5            8                  8
8.6
## 11:             180          180          240                  8
8.0
## 12:             240          210          300                  8
7.8
## 13:             260          250          360                  8
5.1
## 14:             280          260          370                  8
3.7
## 15:             290          280          380                  8
2.8
## 16:             280          280          370                  7
3.3
## 17:             180          190          220                  7
2.9
```

```
## 18:             150              200             190               7
2.2
## 19:             120              150             140               8
1.3
## 20:              90              110             110               8
5.8
## 21:              70               90              80               8
4.1
## 22:              60               70              70               8
1.3
## 23:               0                0               0               7
7.0
## 24:               0                0               0               7
4.1
##     DSWRF_36.75_33 DSWRF_36.75_33.25 DSWRF_36.75_33.5 REL_HUMIDITY_36.25
_33
##     REL_HUMIDITY_36.25_33.25 REL_HUMIDITY_36.25_33.5 REL_HUMIDITY_36.5_3
3
##  1:                     89.0                    80.0                 95.
7
##  2:                     87.9                    77.0                 92.
8
##  3:                     82.7                    74.7                 92.
3
##  4:                     80.8                    75.5                 91.
2
##  5:                     80.9                    77.7                 91.
6
##  6:                     82.7                    80.4                 93.
1
##  7:                     82.1                    78.0                 93.
5
##  8:                     81.7                    80.4                 92.
1
##  9:                     84.4                    83.4                 92.
4
## 10:                     86.5                    80.3                 92.
2
## 11:                     83.6                    74.1                 85.
0
## 12:                     82.9                    70.7                 80.
2
## 13:                     82.1                    70.0                 77.
0
## 14:                     80.0                    67.6                 77.
4
## 15:                     76.5                    66.5                 76.
7
```

```
## 16:                   73.8                   67.3                   76.
8
## 17:                   72.1                   67.1                   78.
7
## 18:                   71.7                   67.3                   79.
1
## 19:                   80.0                   75.0                   83.
1
## 20:                   84.2                   78.7                   89.
3
## 21:                   82.8                   77.1                   90.
9
## 22:                   81.4                   74.7                   89.
4
## 23:                   77.1                   73.0                   84.
9
## 24:                   74.8                   70.5                   83.
5
##     REL_HUMIDITY_36.25_33.25 REL_HUMIDITY_36.25_33.5 REL_HUMIDITY_36.5_3
3
##     REL_HUMIDITY_36.5_33.25 REL_HUMIDITY_36.5_33.5 REL_HUMIDITY_36.75_33
##  1:                   90.5                   75.4                   98.5
##  2:                   90.1                   75.0                   98.3
##  3:                   90.5                   75.3                   98.0
##  4:                   89.7                   75.0                   97.8
##  5:                   89.1                   77.6                   98.0
##  6:                   88.3                   81.4                   97.2
##  7:                   89.0                   77.9                   96.7
##  8:                   87.2                   75.7                   96.6
##  9:                   88.1                   79.8                   96.6
## 10:                   86.3                   77.4                   96.9
## 11:                   81.8                   67.7                   95.4
## 12:                   80.2                   63.7                   95.1
## 13:                   78.5                   61.7                   95.9
## 14:                   78.0                   59.2                   95.7
## 15:                   71.7                   57.1                   96.4
## 16:                   68.2                   57.6                   95.8
## 17:                   67.5                   60.2                   94.7
## 18:                   68.3                   60.9                   94.8
## 19:                   78.3                   67.9                   96.5
## 20:                   84.7                   71.6                   97.7
## 21:                   87.4                   73.2                   97.5
## 22:                   86.7                   73.3                   97.2
## 23:                   85.6                   73.7                   96.9
## 24:                   85.4                   73.4                   97.1
##     REL_HUMIDITY_36.5_33.25 REL_HUMIDITY_36.5_33.5 REL_HUMIDITY_36.75_33
##     REL_HUMIDITY_36.75_33.25 REL_HUMIDITY_36.75_33.5 TEMP_36.25_33
##  1:                   92.7                   86.3         278.620
```

```
##  2:                  89.5                 84.5      277.950
##  3:                  84.6                 83.2      277.368
##  4:                  83.8                 82.8      278.405
##  5:                  83.6                 83.9      278.512
##  6:                  82.1                 85.0      278.064
##  7:                  81.5                 85.2      278.624
##  8:                  82.3                 84.6      278.692
##  9:                  82.0                 87.3      279.296
## 10:                  80.7                 84.9      280.070
## 11:                  78.2                 79.9      280.478
## 12:                  77.1                 79.2      280.869
## 13:                  78.1                 78.6      281.540
## 14:                  78.3                 77.9      281.768
## 15:                  74.5                 72.3      281.732
## 16:                  70.5                 69.9      282.443
## 17:                  70.5                 72.0      282.509
## 18:                  71.5                 76.0      282.232
## 19:                  79.5                 83.1      280.374
## 20:                  85.7                 88.3      279.180
## 21:                  87.6                 86.0      278.788
## 22:                  88.0                 83.7      278.574
## 23:                  87.4                 80.4      278.457
## 24:                  87.3                 79.1      278.437
##      REL_HUMIDITY_36.75_33.25 REL_HUMIDITY_36.75_33.5 TEMP_36.25_33
##      TEMP_36.25_33.25 TEMP_36.25_33.5 TEMP_36.5_33 TEMP_36.5_33.25
##  1:           279.080            280.130      276.110        277.770
##  2:           278.950            281.050      276.130        277.640
##  3:           280.028            281.858      274.988        276.928
##  4:           280.555            281.695      274.565        277.075
##  5:           280.742            280.662      274.822        277.292
##  6:           280.494            280.294      275.064        277.504
##  7:           280.684            281.474      274.854        277.074
##  8:           280.732            281.522      274.532        278.342
##  9:           280.806            280.616      274.506        278.626
## 10:           281.090            281.930      277.250        279.430
## 11:           281.468            283.518      278.748        280.378
## 12:           281.759            284.099      279.799        281.239
## 13:           281.900            284.090      280.340        281.850
## 14:           282.078            284.658      280.298        281.858
## 15:           282.622            284.752      280.432        282.812
## 16:           283.023            284.253      280.143        283.163
## 17:           283.229            284.619      279.719        282.909
## 18:           283.022            284.242      279.332        282.682
## 19:           281.174            282.484      278.354        280.734
## 20:           279.900            281.210      276.920        279.170
## 21:           279.328            280.978      276.228        278.418
## 22:           279.134            280.944      275.964        278.064
## 23:           279.167            280.877      275.787        277.667
```

```
## 24:         279.187         280.937         275.317         277.307
##      TEMP_36.25_33.25 TEMP_36.25_33.5 TEMP_36.5_33 TEMP_36.5_33.25
##      TEMP_36.5_33.5 TEMP_36.75_33 TEMP_36.75_33.25 TEMP_36.75_33.5 produc
tion
## 1:         280.650         274.830         278.170         275.730
0.000
## 2:         280.380         274.710         278.250         275.540
0.000
## 3:         280.148         274.638         278.268         275.448
0.000
## 4:         280.405         274.535         278.015         275.685
0.000
## 5:         280.082         274.362         277.902         275.592
0.000
## 6:         279.474         274.064         278.194         275.714
0.000
## 7:         280.054         274.024         278.464         276.564
0.000
## 8:         281.502         274.262         278.482         277.002
0.000
## 9:         280.996         274.166         278.676         276.626
0.189
## 10:        282.220         274.580         279.150         277.820
1.350
## 11:        284.028         275.548         280.148         279.178
1.730
## 12:        285.209         275.989         280.929         279.799
2.730
## 13:        285.850         276.440         281.210         280.280
1.950
## 14:        286.528         276.698         281.408         280.538
1.350
## 15:        286.952         276.572         282.062         281.192
2.040
## 16:        286.653         276.603         282.503         281.353
3.150
## 17:        286.089         276.509         282.479         281.089
5.830
## 18:        285.672         276.222         282.182         280.602
1.350
## 19:        283.854         275.624         280.914         279.384
0.000
## 20:        282.549         275.220         279.540         277.770
0.000
## 21:        281.898         275.078         278.948         277.098
0.000
## 22:        281.494         274.744         278.524         276.574
0.000
```

```
## 23:         281.037        274.077         278.217         276.467
## 0.000
## 24:         280.607        273.477         277.787         276.277
## 0.000
##      TEMP_36.5_33.5 TEMP_36.75_33 TEMP_36.75_33.25 TEMP_36.75_33.5 produc
## tion
##      trend          dayHour maxPro utilization  avgCLOUD  avgTEMP   avgHUM
##  1:      1  2021-02-01 - 0  0.000           0 28.888889 277.8989 88.87778
##  2:      2  2021-02-01 - 1  0.000           0 33.111111 277.8444 87.25556
##  3:      3  2021-02-01 - 2  0.000           0 34.888889 277.7413 85.56667
##  4:      4  2021-02-01 - 3  0.000           0 39.222222 277.8817 84.57778
##  5:      5  2021-02-01 - 4  0.000           0 49.888889 277.7742 85.32222
##  6:      6  2021-02-01 - 5  0.000           0 53.444444 277.6518 86.48889
##  7:      7  2021-02-01 - 6  0.000           0 59.444444 277.9796 85.68889
##  8:      8  2021-02-01 - 7  0.000           0 65.888889 278.3409 85.31111
##  9:      9  2021-02-01 - 8  0.189         100 68.444444 278.2571 86.85556
## 10:     10  2021-02-01 - 9  1.350         100 70.333333 279.2822 85.97778
## 11:     11 2021-02-01 - 10  1.730         100 67.333333 280.3880 81.52222
## 12:     12 2021-02-01 - 11  2.730         100 68.666667 281.0768 79.65556
## 13:     13 2021-02-01 - 12  1.950         100 71.111111 281.5000 78.55556
## 14:     14 2021-02-01 - 13  1.350         100 74.000000 281.7591 77.53333
## 15:     15 2021-02-01 - 14  2.040         100 74.777778 282.1253 74.94444
## 16:     16 2021-02-01 - 15  3.150         100 76.666667 282.2374 72.57778
## 17:     17 2021-02-01 - 16  5.830         100 72.777778 282.1279 72.85556
## 18:     18 2021-02-01 - 17  1.350         100 59.777778 281.7987 73.53333
## 19:     19 2021-02-01 - 18  0.000           0 48.888889 280.3218 80.52222
## 20:     20 2021-02-01 - 19  0.000           0 41.333333 279.0510 85.11111
## 21:     21 2021-02-01 - 20  0.000           0 36.111111 278.5291 85.17778
## 22:     22 2021-02-01 - 21  0.000           0 31.888889 278.2240 83.96667
## 23:     23 2021-02-01 - 22  0.000           0  9.111111 277.9726 81.77778
## 24:     24 2021-02-01 - 23  0.000           0  8.777778 277.7037 80.57778
##      trend          dayHour maxPro utilization  avgCLOUD  avgTEMP   avgHUM
##       avgDSWRF w_day mon lag72_u lag360_u lag73_u lag168_u lag1_u lag24_
## u
##  1:  0.000000   Pzt Şub      NA       NA      NA       NA     NA      N
## A
##  2:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
##  3:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
##  4:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
##  5:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
##  6:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
##  7:  0.000000   Pzt Şub      NA       NA      NA       NA      0      N
## A
```

```
##  8:   0.000000   Pzt Şub   NA    NA    NA    NA     0     N
A
##  9:   0.000000   Pzt Şub   NA    NA    NA    NA     0     N
A
## 10:   6.444444   Pzt Şub   NA    NA    NA    NA   100     N
A
## 11: 147.777778   Pzt Şub   NA    NA    NA    NA   100     N
A
## 12: 203.333333   Pzt Şub   NA    NA    NA    NA   100     N
A
## 13: 243.333333   Pzt Şub   NA    NA    NA    NA   100     N
A
## 14: 262.222222   Pzt Şub   NA    NA    NA    NA   100     N
A
## 15: 287.777778   Pzt Şub   NA    NA    NA    NA   100     N
A
## 16: 296.666667   Pzt Şub   NA    NA    NA    NA   100     N
A
## 17: 264.444444   Pzt Şub   NA    NA    NA    NA   100     N
A
## 18: 233.333333   Pzt Şub   NA    NA    NA    NA   100     N
A
## 19: 176.666667   Pzt Şub   NA    NA    NA    NA   100     N
A
## 20: 133.333333   Pzt Şub   NA    NA    NA    NA     0     N
A
## 21: 106.666667   Pzt Şub   NA    NA    NA    NA     0     N
A
## 22:  87.777778   Pzt Şub   NA    NA    NA    NA     0     N
A
## 23:   0.000000   Pzt Şub   NA    NA    NA    NA     0     N
A
## 24:   0.000000   Pzt Şub   NA    NA    NA    NA     0     N
A
##      avgDSWRF w_day mon lag72_u lag360_u lag73_u lag168_u lag1_u lag24_
u
##    lag720_u predicted_reg predicted differ Date predicted_differ foreca
stval
##  1:     NA         0         0    NA   NA              NA
NA
##  2:     NA        NA         0    NA   NA              NA
NA
##  3:     NA        NA         0    NA   NA              NA
NA
##  4:     NA        NA         0    NA   NA              NA
NA
##  5:     NA        NA         0    NA   NA              NA
NA
```

```
##   6:      NA        NA      NA    NA    NA          NA
NA
##   7:      NA        NA      NA    NA    NA          NA
NA
##   8:      NA        NA      NA    NA    NA          NA
NA
##   9:      NA        NA      NA    NA    NA          NA
NA
## 10:      NA        NA      NA    NA    NA          NA
NA
## 11:      NA        NA      NA    NA    NA          NA
NA
## 12:      NA        NA      NA    NA    NA          NA
NA
## 13:      NA        NA      NA    NA    NA          NA
NA
## 14:      NA        NA      NA    NA    NA          NA
NA
## 15:      NA        NA      NA    NA    NA          NA
NA
## 16:      NA        NA      NA    NA    NA          NA
NA
## 17:      NA        NA      NA    NA    NA          NA
NA
## 18:      NA        NA      NA    NA    NA          NA
NA
## 19:      NA        NA      NA    NA    NA          NA
NA
## 20:      NA        NA      NA    NA    NA          NA
NA
## 21:      NA        NA      NA    NA    NA          NA
NA
## 22:      NA        NA       0    NA    NA          NA
NA
## 23:      NA        NA       0    NA    NA          NA
NA
## 24:      NA        NA       0    NA    NA          NA
NA
##     lag720_u predicted_reg predicted differ Date predicted_differ foreca
stval
```

Code

With the help of shift function the difference predictions are converted to the utilization predictions.

11.1 MAD values

Code

MAD values are calculated.

12 RESULTS

> The two models have been compared using a test date between 01-05-2022 and 24-05-2022. The models made their predictions and then the residuals have been compared using mean absolute deviation. MAPE wasn't chosen, since there many data points at night where the production was 0 and MAPE doesn't work when the actual value is 0, even for one realization and the data at hand had many. The resulting MADs are 5.5% for ARIMA model and 15.72% for regression model. Based on this performance measure, ARIMA(2,0,1) to the differenced utilizations has been chosen as the model that is predicting the best.

13 CONCLUSION AND FUTURE WORK

> The approach used in this model is fit for a data this size and complex. Another approach to go might have been to disregard the data prior to government intervention or dividing the data by hour and coming up with 24 different models. First has been rejected since the data lost would vast and the second has been rejected since the previous hours is carrying some information as can be seen from the regression model. The 73-hour lag, which one hour previous of the prediction houri was very significant while fitting a regression model. Finally, a differenced ARIMA(2,0,1) is chosen to represent the data.

14 References

Kıvanç Enerji (https://www.kivancenerji.com.tr/kivanc2ges.html) Enerji Atlası (https://www.enerjiatlasi.com/gunes/kivanc-2-ges.html)