Moneyball - CUNY Data Science 621 - Appendices

Eric Hirsch

2/20/2021

Appendix A - Code

Libraries

```
library(Hmisc)
library(psych)
library(tidyverse)
library(skimr)
library(gridExtra)
library(data.table)
library(mltools)
library(MASS)
library(car)
library(patchwork)
library(ggthemes)
library(tinytex)
library(stats)
library(EHData)
library(ggsci)
```

Read Data

```
dfTrain <- read.csv("D:\\RStudio\\CUNY_621\\Baseball\\moneyball-training-data.csv", head=TRUE)
dfEval <- read.csv("D:\\RStudio\\CUNY_621\\Baseball\\moneyball-evaluation-data.csv", head=TRUE)

# Simplify names

colnames(dfTrain)<-gsub("TEAM_","",colnames(dfTrain))
colnames(dfEval)<-gsub("TEAM_","",colnames(dfEval))
```

1. Data Exploration

```
summary(dfTrain)

# Histograms
```

```r
df_NoIndex <- dfTrain %>%
  dplyr::select(-INDEX)

a <- EHSummarize_SingleColumn_Histograms(df_NoIndex, font_size = 9)
grid.arrange(grobs=a[c(1:16)], ncol=4, top = "Column Distributions", bottom="Fig. 1")

# Boxplots

a <- EHSummarize_SingleColumn_Boxplots(df_NoIndex, font_size=9)
grid.arrange(grobs=a[c(1:16)], ncol=4, top = "Boxplots for Outlier Analysis", bottom="Fig. 2")

# Scatterplots

a <-  EHExplore_TwoContinuousColumns_Scatterplots(df_NoIndex, "TARGET_WINS")
grid.arrange(grobs=a[c(2:16)], ncol=3, top = "Scatterplots Against TARGET_WINS", bottom="Fig.3")

# Multicollinearity
  EHExplore_Multicollinearity(dfTrain, title="Correlations, Fig. 4", run_all = FALSE)
```

2. Data Preparation

```r
# Create Missing Flags for train and test sets and remove two columns
dfTrain1 <- dfTrain %>%
  dplyr::select(-BATTING_HBP, -BASERUN_CS)

dfTrain2 <- dfTrain1 %>%
  mutate(PSO_Missing_Flag = ifelse(is.na(PITCHING_SO),1,0), BSO_Missing_Flag = ifelse(is.na(BATTING_SO)

dfEval1 <- dfTrain %>%
  dplyr::select(-BATTING_HBP, -BASERUN_CS)

dfEval2 <- dfEval1 %>%
  mutate(PSO_Missing_Flag = ifelse(is.na(PITCHING_SO),1,0), BSO_Missing_Flag = ifelse(is.na(BATTING_SO)

# Analyze missing values
dfTrain22 <- dfTrain2 %>%
  dplyr::select(PSO_Missing_Flag, BSO_Missing_Flag, BRSB_Missing_Flag, FDP_Missing_Flag)

z1 <- EHExplore_TwoCategoricalColumns_Barcharts(dfTrain22, "BSO_Missing_Flag")
z2 <- EHExplore_TwoCategoricalColumns_Barcharts(dfTrain22, "BRSB_Missing_Flag")
z3 <- c(z1, z2)

# Remove Pitching SO
dfTrain2 <- dfTrain2 %>%
  dplyr::select(-PSO_Missing_Flag)

dfEval2 <- dfEval2 %>%
  dplyr::select(-PSO_Missing_Flag)

grid.arrange(grobs=z3[c(1,3:4,8)], ncol=2, top="Overlap of NA's Among Columns", bottom = "Fig. 5")
```

```r
# Investigate interactions with BSO_Missing_Flag
a <- EHExplore_Interactions_Scatterplots(dfTrain2, "TARGET_WINS", "BSO_Missing_Flag")

grid.arrange(a[[6]], a[[10]], a[[11]], a[[12]], a[[14]], ncol=2, top = "Selected Interactions with Missi
```

```r
# Impute Missing values on train and test sets

dfTrain2 <- dfTrain2 %>%
  mutate(PITCHING_SO = ifelse(PITCHING_SO==0, NA, PITCHING_SO)) %>%
  mutate(BATTING_SO = ifelse(BATTING_SO==0, NA, BATTING_SO)) %>%
  mutate(BATTING_HR = ifelse(BATTING_HR==0, NA, BATTING_HR))

 dfTrain2 <- EHPrepare_MissingValues_Imputation(dfTrain2, "TARGET_WINS")

dfEval2 <- dfEval2 %>%
  mutate(PITCHING_SO = ifelse(PITCHING_SO==0, NA, PITCHING_SO)) %>%
  mutate(BATTING_SO = ifelse(BATTING_SO==0, NA, BATTING_SO)) %>%
  mutate(BATTING_HR = ifelse(BATTING_HR==0, NA, BATTING_HR))

 dfEval2 <- EHPrepare_MissingValues_Imputation(dfEval2, "TARGET_WINS")

 dfTrain_NoTransformations <- dfTrain2
```

3. Data Modeling

```r
# Create flag for pitching_H < 1500
dfPH <- dfTrain2 %>%
  dplyr::select(TARGET_WINS, PITCHING_H)

dfPH2 <- dfPH %>%
  dplyr::filter(PITCHING_H <= 3000)

x1 <- EHExplore_TwoContinuousColumns_Scatterplots(dfPH, "TARGET_WINS")
x2 <- EHExplore_TwoContinuousColumns_Scatterplots(dfPH2, "TARGET_WINS")

grid.arrange(x1[[2]], x2[[2]], ncol=2, top="Pitching_H Against Wins, All Records (left) and Hits Below 3


dfTrain2 <- dfTrain2 %>%
  mutate(Pitch_h_Under1500 = ifelse(PITCHING_H<=1500, 1, 0))

dfEval2 <- dfEval2 %>%
  mutate(Pitch_h_Under1500 = ifelse(PITCHING_H<=1500, 1, 0))
```

```r
# Interaction between Fielding_DP and hits

dfTrain2 <- dfTrain2 %>%
  mutate(DP_times_PH = FIELDING_DP*PITCHING_H)

dfEval2 <- dfEval2 %>%
  mutate(DP_times_PH = FIELDING_DP*PITCHING_H)
```

```r
a <- summary(lm(TARGET_WINS ~ FIELDING_DP, dfTrain2))$adj.r.squared
b <- summary(lm(TARGET_WINS ~ FIELDING_DP + PITCHING_H, dfTrain2))$adj.r.squared
c <- summary(lm(TARGET_WINS ~ FIELDING_DP + PITCHING_H + DP_times_PH, dfTrain2))$adj.r.squared
```

```r
# Examine HR variables
a <- ggplot(dfTrain2, aes(BATTING_HR, PITCHING_HR)) +
        EHTheme() +
  geom_point(fill="navy", color="white") +
  geom_smooth(method = "loess", color="red", fill="lightcoral") +
  ggtitle("Batting_HR vs Ptching_HR")

 grid.arrange(a, bottom="Fig. 8")

# drop pitching HR

dfTrain2 <- dfTrain2 %>%
  dplyr::select(-PITCHING_HR)


dfEval2 <- dfEval2 %>%
  dplyr::select(-PITCHING_HR)
```

```r
# Examining HR bimodal distribution
dfPH3 <- dfTrain2 %>%
  dplyr::select(BATTING_HR)

dfPH4 <- dfPH3 %>%
  dplyr::filter(BATTING_HR <= 100)

x1 <- EHSummarize_SingleColumn_Histograms(dfPH3)
x2 <- EHSummarize_SingleColumn_Histograms(dfPH4, hist_nbins = 100)

grid.arrange(x1[[1]], x2[[1]], ncol=2, top="Distribution of Batting HR, All Records (left) and HR below

# Create HR <80 Flag

dfTrain2 <- dfTrain2 %>%
  mutate(Bat_hr_Under60 = ifelse(BATTING_HR<=80, 1, 0))

dfEval2 <- dfEval2 %>%
  mutate(Bat_hr_Under60 = ifelse(BATTING_HR<=80, 1, 0))

summary(lm(TARGET_WINS ~ BATTING_HR, dfTrain2))$adj.r.squared
summary(lm(TARGET_WINS ~ BATTING_HR + Bat_hr_Under60, dfTrain2))$adj.r.squared
```

```r
#Create Fielding Errors Squared

dfTrain2 <- dfTrain2 %>%
  mutate(Fielding_Errors_sq = FIELDING_E^2)

dfEval2 <- dfEval2 %>%
  mutate(Fielding_Errors_sq = FIELDING_E^2)
```

```
summary(lm(TARGET_WINS ~ FIELDING_E, dfTrain2))$adj.r.squared
summary(lm(TARGET_WINS ~ FIELDING_E  + Fielding_Errors_sq, dfTrain2))$adj.r.squared
```

```
# Create interaction temrs with SO_Missing

dfTrain2 <- dfTrain2 %>%
  mutate(Interaction_pbb_With_SO_Missing = PITCHING_BB*BSO_Missing_Flag) %>%
  mutate(Interaction_err_With_SO_Missing = FIELDING_E*BSO_Missing_Flag) %>%
  mutate(Interaction_bh_With_SO_Missing = BATTING_H*BSO_Missing_Flag) %>%
  mutate(Interaction_bhr_With_SO_Missing = BATTING_HR*BSO_Missing_Flag) %>%
  mutate(Interaction_bbb_With_SO_Missing = BATTING_BB*BSO_Missing_Flag) %>%
  mutate(Interaction_sb_With_SO_Missing = BASERUN_SB*BSO_Missing_Flag)

dfEval2 <- dfEval2 %>%
  mutate(Interaction_pbb_With_SO_Missing = PITCHING_BB*BSO_Missing_Flag) %>%
  mutate(Interaction_err_With_SO_Missing = FIELDING_E*BSO_Missing_Flag) %>%
  mutate(Interaction_bh_With_SO_Missing = BATTING_H*BSO_Missing_Flag) %>%
  mutate(Interaction_bhr_With_SO_Missing = BATTING_HR*BSO_Missing_Flag) %>%
  mutate(Interaction_bbb_With_SO_Missing = BATTING_BB*BSO_Missing_Flag) %>%
  mutate(Interaction_sb_With_SO_Missing = BASERUN_SB*BSO_Missing_Flag)
```

4. Model Selection

```
# Model 1
a <- EHModel_Regression_StandardLM(dfTrain_NoTransformations, "TARGET_WINS")

# Create df without influential pints to use for later
dfTrain5 <- dfTrain2 %>%
  filter(rownames(dfTrain2) != "1342" & rownames(dfTrain2) != "2223" & rownames(dfTrain2) != "2316" & r

# Model 2
step2 <- EHModel_Regression_StandardLM(dfTrain2, "TARGET_WINS")

# Anova on two regressions
anova(a, step2)
```

```
# Model 3

# Create Power scores
dfTrain3 <- dfTrain_NoTransformations

dfCat <- dfTrain3 %>% mutate(category_PH=as.numeric(cut(PITCHING_H, breaks=c(-Inf, quantile(dfTrain3$PI

dfCat <- dfCat %>% mutate(category_PBB=as.numeric(cut(PITCHING_BB, breaks=c(-Inf, quantile(dfTrain3$PIT

dfCat  <- dfCat %>% mutate(category_BH=as.numeric(cut(BATTING_H, breaks=c(-Inf, quantile(dfTrain3$BATTI

dfCat  <- dfCat %>% mutate(category_BBB=as.numeric(cut(BATTING_BB, breaks=c(-Inf, quantile(dfTrain3$BAT

dfCat <- dfCat %>%
```

```
  mutate(Hitting_Power = as.numeric(category_BH) + as.numeric(category_BBB)) %>%
  mutate(Pitching_Weakness = as.numeric(category_PH) + as.numeric(category_PBB))
```

```
# Examine correlation between Batting and Hitting
cor(dfCat$Hitting_Power, dfCat$Pitching_Weakness)

# Show with boxplots

a <- ggplot(dfCat, aes(as.factor(Hitting_Power), TARGET_WINS)) +
        geom_boxplot() + EHTheme() + xlab("Hitting Power, Low to High")

b <- ggplot(dfCat, aes(as.factor(Pitching_Weakness), TARGET_WINS)) +
        geom_boxplot() + EHTheme() + xlab("Pitching Weakness, Low to High")

grid.arrange(a,b, ncol=2, top="The Impact of Hitting Power and Pitching Weakness on Target Wins", botto
```

```
# Run madle 3
dfCat <- dfAll %>%
  mutate(Total_Power = Hitting_Power - Pitching_Weakness)

summary(lm(TARGET_WINS ~ Total_Power, dfCat))

summary(lm(TARGET_WINS ~ Hitting_Power, dfCat))

summary(lm(TARGET_WINS ~ Pitching_Weakness, dfCat))

summary(lm(TARGET_WINS ~ Hitting_Power + Pitching_Weakness, dfCat))
```

5. Select a Model and Make Predicitons

```
step3 <- EHModel_Regression_StandardLM(dfTrain5, "TARGET_WINS")
```

6. Predictions

```
#Make predictions
makePredictions <- function(m)
{
predictions <- as.data.frame(predict(m,newdata=dfEval2))
write_csv(predictions, "C:\\Users\\Eric\\Desktop\\predictionsBB.csv")
}

a <- makePredictions(step2)

head(a)
```

Appendix B

Data Visualization Package (EHData) that I created and used for this assignment

```
library(devtools)
library(roxygen2)
library(Hmisc)
library(psych)
library(tidyverse)
library(skimr)
library(purrr)
library(tidyr)
library(tidyverse)
library(gridExtra)
library(lubridate)
library(fastDummies)
library(data.table)
library(mltools)
library(car)
library(patchwork)
library(ggthemes)
library(tinytex)
library(stats)
library(ggsci)
library(scales)
library(naniar)

EHTheme <- function(){

  x <- theme(axis.title.x = element_text(size = 12), axis.title.y = element_text(size = 9), axis.text.x

  return (x)

}


EHSummarize_MissingValues <- function(df)
{

  library(naniar)

  #1. Missing Completely at Random (MCAR):
  #2. Missing at Random (MAR):
  #3. Missing Not at Random (MNAR)

  list12 = list()

  list12[[1]] <- gg_miss_var(df)
  list12[[2]] <- vis_miss(df)
  list12[[3]] <- gg_miss_upset(df)

  return(list12)


}
```

```r
EHPrepare_MissingValues_Imputation <- function(df, y)
{

  #1. Missing Completely at Random (MCAR):
  #2. Missing at Random (MAR):
  #3. Missing Not at Random (MNAR)

  dfImputedMean <- data.frame(
    sapply(df, function(x) ifelse(is.na(x), mean(x, na.rm = TRUE), x)))

  dfImputedMedian <- data.frame(
    sapply(df, function(x) ifelse(is.na(x), median(x, na.rm = TRUE), x)))

  dfOmit <- na.omit(df)

  fla <- substitute(n ~ ., list(n = as.name(y)))
  m1 <- lm(fla, dfImputedMean)
  step1 <- stepAIC(m1, trace=FALSE)
  s1 <- summary(step1)$adj.r.squared

  fla2 <- substitute(n ~ ., list(n = as.name(y)))
  m2 <- lm(fla2, dfImputedMedian)
  step2 <- stepAIC(m2, trace=FALSE)
  s2 <- summary(step2)$adj.r.squared

  fla3 <- substitute(n ~ ., list(n = as.name(y)))
  m3 <- lm(fla3, dfOmit)
  step3 <- stepAIC(m3, trace=FALSE)
  s3 <- summary(step3)$adj.r.squared

  l1 <- vector(mode = "list", length = 5)
  names(l1) <- c("df", "type", "r2mean", "r2median", "r2omit")

  l1$r2mean = s1
  l1$r2median = s2
  l1$r2omit = s3

  if (s1>=s2) {
    l1$type = "mean"
    l1$df=dfImputedMean

    print(c("type:", l1$type))
    print(c("r2mean:", round(l1$r2mean,4)))
    print(c("r2median:", round(l1$r2median,4)))
    print(c("r2omit", round(l1$r2omit,4)))

    return (l1$df)
  }
  else {
    l1$type = "median"
    l1$df=dfImputedMedian
```

```
    print(c("type:", l1$type))
    print(c("r2mean:", round(l1$r2mean,4)))
    print(c("r2median:", round(l1$r2median,4)))
    print(c("r2omit", round(l1$r2omit,4)))

    return (l1$df)
  }
}

EHExplore_Interactions_Scatterplots <- function(df, y, interaction) {

  library(ggsci)

  df <- select_if(df, is.numeric)

  df[,interaction] <- as.factor(df[,interaction])

  plot_list <- list()

  for(i in 1:ncol(df)) {

    p <- eval(substitute(ggplot(df, aes_string(df[ , i], y, color=interaction)) +
                          geom_point(alpha=.1) +
                          geom_smooth(method = "lm") +
                          xlab("") +
                          theme(title = element_text(size=7), axis.title.x = element_text(size = 7), a
                          scale_color_d3()+
                          scale_fill_d3()+
                          ggtitle(colnames(df)[i]), list(i=i)))
    plot_list[[i]] <- p

  }
  return(plot_list)
}

EHSummarize_SingleColumn_Boxplots <- function(df, font_size=7)
{
  df <- select_if(df, is.numeric)


plot_list2 <- list()

for(i in 1:ncol(df)) {

  qp <- toString(head(sort(round(df[,i],2)),5))
  qz <- toString(tail(sort(round(df[,i],2)),5))
  qk <- str_c("L:   ", qp, "\\n", "H:   ", qz)

  qk <- gsub('\\\\','', qk)

  p <- eval(substitute(ggplot(df, aes(df[,i])) +
                        coord_flip() +
                        xlab(colnames(df)[i])  +
```

```
                         ylab(qk) +
                         theme(axis.title.x = element_text(size = font_size), axis.title.y = element_te
                         geom_boxplot(), list(i=i)))

  plot_list2[[i]] <- p


}
return (plot_list2)
}

EHExplore_OneContinuousAndOneCategoricalColumn_Boxplots <- function(df, x)
{
  library(ggsci)
  df <- select_if(df, is.numeric)

  plot_list3 <- list()

  for(i in 1:ncol(df)) {

    print(colnames(df)[i])
    print(colnames(df)[x])
    ct <- cor.test(df[,i], df[,x])

    xText <- str_c("Correlation: ", round(ct$estimate,2), "   p value: ", round(ct$p.value,2))

    df[,x] <- as.factor(df[,x])
    p <- ggplot(df, aes_string(y=df[,i], x=x, fill=x)) +
                           xlab(x)  +
                           ylab(xText) +
                           theme(axis.title.x = element_text(size = 9), axis.title.y = element_text(siz
                            scale_color_d3()+
                            scale_fill_d3()+
                            geom_boxplot()


    plot_list3[[i]] <- eval(substitute(p, list(i=i)))


  }
  return (plot_list3)
}

EHSummarize_SingleColumn_Histograms <- function(df, font_size = 7, hist_nbins = 20)
{

  df <- select_if(df, is.numeric)

  plot_list2 <- list()

  for(i in 1:ncol(df)) {

    qp <- toString(head(sort(round(df[,i],2)),5))
```

```
    qz <- toString(tail(sort(round(df[,i],2)),5))
    qk <- str_c("L:   ", qp, "\\\n", "H:   ", qz)

    qk <- gsub('\\\\','', qk)

    p <- eval(substitute(ggplot(df, aes(df[,i])) +
                           ylab(colnames(df)[i])  +
                           xlab(qk) +
                           theme(axis.title.x = element_text(size = font_size), axis.title.y = element_
                           geom_histogram(bins=hist_nbins, fill="white", aes(y = stat(density))) +
                           geom_density(col = "red"), list(i=i)))
    plot_list2[[i]] <- p

  }
  return (plot_list2)
}


EHExplore_TwoContinuousColumns_Scatterplots <- function(df, y, flip=FALSE)
{
  plot_list <- list()

  df <- select_if(df, is.numeric)

  for(i in 1:ncol(df)) {

    ct <- cor.test(df[,i], df[,y])

    xText <- str_c("Correlation: ", round(ct$estimate,2), "   p value: ", round(ct$p.value,2))

    x1 = df[[i]]
    y1 =y

    if(flip)
    {
      x1=y
      y1=df[[i]]
    }

    p <- ggplot(df, aes_string(x1, y1)) +
      geom_point(fill="navy", color="white") +
      geom_smooth(method = "loess", color="red", fill="lightcoral") +
      ylab(y) +
      xlab(xText) +
      theme(title = element_text(size=9), axis.title.x = element_text(size = 8), axis.title.y = element_
      ggtitle(colnames(df)[i])

    p <- eval(substitute(p, list(i=i)))
    plot_list[[i]] <- p

  }
  return(plot_list)
}
```

```r
EHSummarize_StandardPlots <-function(data, y, return_list = FALSE, h_nbins = 20, print=TRUE)
{

  list1 <- EHExplore_Outliers_Boxplots(data)
  list2 <- EHExplore_Distributions_Histograms(data, hist_nbins =  h_nbins)
  list3 <- EHExplore_Correlations_Scatterplots(data, y)

  zz2 <- list()



  for(i in 1:length(list1)) {
    zz2[i*3-2] <- list1[i]
    zz2[i*3-1] <- list2[i]
    zz2[i*3] <- list3[i]
  }

  if (print) {
    lenZ <- length(zz2)
    quotient <- lenZ %/% 9
    gap <- lenZ - quotient*9
    gaprows <- gap/3


    for(i in 1:quotient) {

      start <- (i-1)*9 + 1
      finish <- start + 8

      grid.arrange(grobs=zz2[c(start:finish)], ncol=3)

    }

    if (gaprows>0) {

      start <- quotient*9 + 1
      finish <- start + gaprows*3 - 1

      grid.arrange(grobs=zz2[c(start:finish)], ncol=3, nrow=gaprows)
    }
  }

  if (return_list) {
    return (zz2)
  }

}

EHExplore_Multicollinearity <-function(df, run_all=FALSE, title="Heatmap for Multicollinearity Analysis

  dfCor <- as.data.frame(cor(df))
```

```
  library(corrplot)
  my_matrix <- df[]
  cor_res <- cor(my_matrix, use = "na.or.complete")

  if (run_all) {
    pairs.panels(df)
    print(dfCor)
    corrplot(cor_res, method = 'number')
  }

  library(corrplot)
  my_matrix <- df[]
  cor_res <- cor(my_matrix, use = "na.or.complete")

  z <- corrplot(cor_res, title = title, mar=c(0,0,2,0),
                diag=FALSE, type = "upper", order = "original", tl.col = "black", tl.srt = 45, tl.cex =

  #return (z)

}


EHModel_Regression_StandardLM <- function(df, y) {

  fla <- substitute(n ~ ., list(n = as.name(y)))

  par(mfcol=c(2,2))

  mod_4 <- lm(fla, df)
  step3 <- stepAIC(mod_4, trace=FALSE)
  print(summary(step3))

  print("VIF Analysis")
  vif_values <- car::vif(step3)
  print(vif_values)

  print(plot(step3))

  return(step3)

}

EHExplore_TwoCategoricalColumns_Barcharts <- function(df, y)
{

  plot_list4 <- list()

  df <- select_if(df, is.numeric)

  df[,y] <- as.factor(df[,y])

  for(i in 1:ncol(df)) {
```

```
    df[,i] <- as.factor(df[ ,i])

    p <- ggplot(df, aes_string(x=df[ , i], fill=y)) +
      geom_bar(position = "fill") +
      ylab("Proportion") +
      xlab(colnames(df)[i]) +
      stat_count(geom="text", aes(label=stat(count)), position=position_fill(vjust=.5), color="black") +
      scale_color_d3()+
      scale_fill_d3()+
      theme(title = element_text(size=9), axis.title.x = element_text(size = 8), axis.title.y = element_
      ggtitle(colnames(df)[i])

    p <- eval(substitute(p, list(i=i)))
    plot_list4[[i]] <- p
  }

  return (plot_list4)
}
```

Appendix C

Predictions

```
df <- read.csv("D:\\RStudio\\CUNY_621\\predictionsBB.csv")
print(df)
```

```
##      predict.m..newdata...dfEval2.
## 1                         65.55191
## 2                         73.00183
## 3                         74.25101
## 4                         69.95245
## 5                         66.80497
## 6                         70.24417
## 7                         66.29278
## 8                         71.06411
## 9                         74.46557
## 10                        66.37215
## 11                        69.46976
## 12                        77.74397
## 13                        76.93263
## 14                        70.89365
## 15                        83.13329
## 16                        82.84444
## 17                        88.78233
## 18                        81.68573
## 19                        75.63521
## 20                        86.88036
## 21                        74.96393
## 22                        76.82949
## 23                        78.60665
## 24                        87.13806
## 25                        83.45039
```

```
## 26                         77.23266
## 27                         78.86895
## 28                         76.38967
## 29                         76.77439
## 30                         70.04479
## 31                         80.91321
## 32                         83.52546
## 33                         91.89455
## 34                         85.97919
## 35                         88.92170
## 36                         82.22702
## 37                         78.10795
## 38                         86.95044
## 39                         83.69726
## 40                         89.93390
## 41                         87.63146
## 42                         95.15289
## 43                         89.73065
## 44                         78.31297
## 45                         96.70592
## 46                         87.44049
## 47                         89.78451
## 48                         92.55031
## 49                         84.34227
## 50                         71.77717
## 51                         81.43123
## 52                         78.69631
## 53                         76.85425
## 54                         79.21440
## 55                        100.25702
## 56                         99.14342
## 57                         83.16530
## 58                        100.35466
## 59                         97.90465
## 60                         94.72824
## 61                         78.09780
## 62                         57.45653
## 63                         88.51450
## 64                         68.32624
## 65                         86.80110
## 66                         84.55948
## 67                         87.11471
## 68                        100.41104
## 69                        115.49921
## 70                         93.60006
## 71                         97.35404
## 72                        113.95254
## 73                         92.26079
## 74                         93.98473
## 75                         94.75779
## 76                         77.01866
## 77                         57.46773
## 78                         57.70466
## 79                         61.15589
```

```
## 80                           44.13604
## 81                           82.02524
## 82                           81.20671
## 83                           48.95951
## 84                           63.68842
## 85                           74.95106
## 86                           74.49601
## 87                           78.14866
## 88                           72.43367
## 89                           70.70922
## 90                           75.58188
## 91                           71.74207
## 92                           76.26566
## 93                           74.30360
## 94                           91.38236
## 95                           75.23450
## 96                           73.62721
## 97                           71.27857
## 98                           82.87367
## 99                           77.58584
## 100                          80.05358
## 101                          77.53620
## 102                          77.51519
## 103                          79.55527
## 104                          72.22418
## 105                          76.07731
## 106                          72.63919
## 107                          81.77392
## 108                          74.63977
## 109                          71.75797
## 110                          72.39270
## 111                          69.54975
## 112                          68.50319
## 113                          71.87177
## 114                          65.35577
## 115                          67.93539
## 116                          80.53045
## 117                          78.99818
## 118                          84.78329
## 119                          88.66635
## 120                          79.83718
## 121                          83.09723
## 122                          81.80781
## 123                          70.75139
## 124                          80.68044
## 125                          80.84626
## 126                          86.97092
## 127                          84.79816
## 128                          84.21661
## 129                          84.05194
## 130                          81.29710
## 131                          75.61989
## 132                          82.11703
## 133                          77.91876
```

```
## 134                          85.81814
## 135                          73.92727
## 136                          78.22515
## 137                          89.57097
## 138                          79.48114
## 139                          88.44021
## 140                          79.21477
## 141                          73.00361
## 142                          72.64040
## 143                          79.11972
## 144                          78.02837
## 145                          77.01566
## 146                          70.81433
## 147                          75.44452
## 148                          80.55652
## 149                          87.44070
## 150                          76.58422
## 151                          69.97746
## 152                          72.22479
## 153                          83.30746
## 154                          71.31659
## 155                          75.26072
## 156                          86.58829
## 157                          86.33451
## 158                          87.87217
## 159                          84.89918
## 160                          80.70021
## 161                          84.76539
## 162                          88.20931
## 163                          89.48089
## 164                          92.98312
## 165                          90.00451
## 166                          83.03176
## 167                          89.25453
## 168                          80.10568
## 169                          81.92140
## 170                          82.56450
## 171                          66.27968
## 172                          73.35852
## 173                          61.02738
## 174                          72.28051
## 175                          84.80314
## 176                          77.96885
## 177                          84.73929
## 178                          67.83358
## 179                          37.20481
## 180                          48.14760
## 181                          60.87088
## 182                          64.83300
## 183                          66.87822
## 184                          63.66113
## 185                          79.05949
## 186                          65.35653
## 187                          76.64316
```

```
## 188                          75.60494
## 189                          93.95756
## 190                          94.75443
## 191                          99.44551
## 192                          84.28355
## 193                          89.17281
## 194                          74.04649
## 195                          72.01181
## 196                          80.56895
## 197                          76.79435
## 198                          73.20580
## 199                          81.34510
## 200                          75.67742
## 201                          73.85718
## 202                          79.83315
## 203                          84.62222
## 204                          80.06155
## 205                          79.57510
## 206                          77.37831
## 207                          86.77487
## 208                          74.98901
## 209                          74.99894
## 210                          77.05436
## 211                          72.09386
## 212                          74.39570
## 213                          76.96458
## 214                          75.75151
## 215                          71.66229
## 216                          67.26449
## 217                          71.63299
## 218                          72.01206
## 219                          68.80844
## 220                          73.46381
## 221                          77.22493
## 222                          70.22170
## 223                          70.19984
## 224                          77.17477
## 225                          76.88357
## 226                          76.49158
## 227                          78.90521
## 228                          77.89276
## 229                          72.68706
## 230                          83.51177
## 231                          74.67146
## 232                          69.84811
## 233                          91.66123
## 234                          89.04173
## 235                          87.00029
## 236                          68.06005
## 237                          89.05831
## 238                          80.87576
## 239                          81.45000
## 240                          78.20661
## 241                          80.03334
```

```
## 242                       79.36362
## 243                       84.27763
## 244                       88.32514
## 245                       77.14155
## 246                       90.41355
## 247                       85.65255
## 248                       78.14958
## 249                       86.69512
## 250                       80.27654
## 251                       83.14703
## 252                       70.45635
## 253                       81.64373
## 254                       80.74462
## 255                       79.38861
## 256                       86.29034
## 257                       84.13201
## 258                       93.19836
## 259                       87.91209
## 260                       92.72209
## 261                       89.01357
## 262                       90.43686
## 263                       89.65688
## 264                       86.16842
## 265                       78.53071
## 266                       73.42320
## 267                       87.43721
## 268                       83.89223
## 269                       70.97937
## 270                       78.01342
## 271                       76.46185
## 272                       70.01677
## 273                       79.78304
## 274                       49.91156
## 275                       68.89681
## 276                       82.42838
## 277                       79.35215
## 278                       49.23907
## 279                       96.44614
## 280                       62.78509
## 281                       68.31919
## 282                       78.69826
## 283                       80.67865
## 284                       69.58553
## 285                       90.73698
## 286                      133.66380
## 287                      113.08028
## 288                      127.12961
## 289                      123.52734
## 290                      101.66217
## 291                       99.40436
## 292                       77.12302
## 293                       63.92972
## 294                       63.82188
## 295                      102.06470
```

```
## 296                          87.85726
## 297                          90.71771
## 298                         110.03213
## 299                         112.56379
## 300                          83.43744
## 301                          83.80663
## 302                          83.40125
## 303                          76.09605
## 304                          78.50300
## 305                          52.20070
## 306                          72.91166
## 307                          74.42062
## 308                          81.81497
## 309                          91.59737
## 310                          83.32705
## 311                          98.57849
## 312                          84.12138
## 313                          78.26140
## 314                          79.18204
## 315                          75.95404
## 316                          74.90443
## 317                          74.61564
## 318                          80.67474
## 319                          81.92859
## 320                          79.55470
## 321                          68.79082
## 322                          67.90819
## 323                          71.65708
## 324                          68.67376
## 325                          73.03734
## 326                          66.92058
## 327                          67.22255
## 328                          65.41780
## 329                          76.53480
## 330                          85.41358
## 331                          85.24160
## 332                          86.33617
## 333                          89.95231
## 334                          90.18323
## 335                          90.03554
## 336                          91.31450
## 337                          72.13036
## 338                          79.27497
## 339                          71.75159
## 340                          84.08481
## 341                          90.29398
## 342                          90.41369
## 343                         102.39814
## 344                          83.65855
## 345                          74.11608
## 346                          73.24061
## 347                          81.53293
## 348                          85.48891
## 349                          77.16766
```

```
## 350                        77.04831
## 351                        77.90526
## 352                        75.38979
## 353                        79.96851
## 354                        79.70842
## 355                        80.91207
## 356                        79.33613
## 357                        70.39016
## 358                        78.95200
## 359                        70.93105
## 360                        77.65852
## 361                        78.13204
## 362                        86.93608
## 363                        81.72658
## 364                        84.71531
## 365                        82.57779
## 366                        83.90884
## 367                        85.88070
## 368                        80.95518
## 369                        81.84658
## 370                        78.77067
## 371                        87.04464
## 372                        89.31990
## 373                        83.50006
## 374                        80.00904
## 375                        80.99053
## 376                        68.18538
## 377                        76.51930
## 378                        79.66077
## 379                        87.28799
## 380                        92.64253
## 381                        83.99093
## 382                        88.77144
## 383                        87.39615
## 384                        84.82999
## 385                        81.29013
## 386                        86.73933
## 387                        98.59211
## 388                        90.19458
## 389                        88.54704
## 390                        84.19735
## 391                        30.35911
## 392                        37.18246
## 393                        50.01622
## 394                        55.63881
## 395                        52.63914
## 396                        99.48903
## 397                        77.52753
## 398                        80.32902
## 399                        82.08776
## 400                        65.10853
## 401                        79.61325
## 402                        98.14394
## 403                        96.36429
```

```
## 404                              96.37953
## 405                              83.54787
## 406                              84.61772
## 407                              76.21535
## 408                              89.88489
## 409                              64.43448
## 410                              80.26479
## 411                              86.19696
## 412                              75.83988
## 413                              78.07354
## 414                              71.70651
## 415                              57.37223
## 416                              63.15380
## 417                              64.09999
## 418                             123.67045
## 419                              93.47920
## 420                              92.15568
## 421                              77.93867
## 422                              94.12695
## 423                             102.26343
## 424                              90.29505
## 425                              74.83494
## 426                             101.16465
## 427                              97.35455
## 428                              77.09618
## 429                              91.87652
## 430                              76.70486
## 431                              81.27233
## 432                              83.95916
## 433                              70.17944
## 434                             106.26012
## 435                              99.16509
## 436                              92.99587
## 437                              81.41676
## 438                              82.07542
## 439                              66.14591
## 440                              72.30282
## 441                              69.25086
## 442                              84.68774
## 443                              85.36080
## 444                              97.23854
## 445                             120.42918
## 446                              99.14138
## 447                             104.74468
## 448                              88.16274
## 449                              83.79807
## 450                              85.50493
## 451                              82.31094
## 452                              82.38826
## 453                              72.55288
## 454                              67.35067
## 455                              82.15356
## 456                              77.14821
## 457                              85.83237
```

```
## 458                        86.97012
## 459                        88.76476
## 460                        79.54775
## 461                        79.50107
## 462                        76.33728
## 463                        82.74157
## 464                        82.12601
## 465                        97.93463
## 466                       101.02765
## 467                        86.24322
## 468                        79.09542
## 469                        83.72734
## 470                        84.38245
## 471                        92.38569
## 472                        84.14744
## 473                        80.05130
## 474                        76.41641
## 475                        73.56031
## 476                        71.94474
## 477                        80.03960
## 478                        77.16957
## 479                        90.41803
## 480                        79.64968
## 481                        72.45204
## 482                        74.41907
## 483                        71.93787
## 484                        70.36367
## 485                        74.01667
## 486                        79.84363
## 487                        77.48091
## 488                        79.15073
## 489                        76.29472
## 490                        76.27345
## 491                        72.87925
## 492                        79.80243
## 493                        77.70053
## 494                        76.31867
## 495                        70.65869
## 496                        75.45789
## 497                        64.78003
## 498                        69.28038
## 499                        78.37189
## 500                        79.46774
## 501                        78.23190
## 502                        84.49303
## 503                        80.07494
## 504                        81.78630
## 505                        72.79291
## 506                        77.21512
## 507                        78.37254
## 508                        75.96984
## 509                        80.65548
## 510                        83.12651
## 511                        80.83137
```

```
## 512                          68.32050
## 513                          85.53989
## 514                          79.15487
## 515                          87.33907
## 516                          85.10284
## 517                          82.32810
## 518                          86.06251
## 519                          83.68392
## 520                          85.68516
## 521                          86.41419
## 522                          85.56330
## 523                          82.68400
## 524                          79.60344
## 525                          83.34137
## 526                          79.79234
## 527                          83.55843
## 528                          92.18494
## 529                          79.88232
## 530                          85.37272
## 531                          85.78998
## 532                          76.77021
## 533                          76.21532
## 534                          87.64768
## 535                          81.93706
## 536                          89.00685
## 537                          76.65082
## 538                          82.42557
## 539                          79.66558
## 540                          83.08141
## 541                          66.41185
## 542                          96.65180
## 543                          85.55320
## 544                          83.10899
## 545                          84.58586
## 546                          78.22706
## 547                          97.38683
## 548                          67.11364
## 549                          69.67822
## 550                          88.96917
## 551                          78.23674
## 552                          86.20925
## 553                          77.40755
## 554                          91.01169
## 555                          81.79632
## 556                          85.95612
## 557                          88.27243
## 558                          87.54006
## 559                          84.19177
## 560                          89.62574
## 561                          80.44861
## 562                          79.51266
## 563                          77.56037
## 564                          79.36415
## 565                          76.16739
```

```
## 566                             69.06006
## 567                             81.47053
## 568                             77.11984
## 569                             86.89254
## 570                             92.68498
## 571                             81.50845
## 572                             80.12239
## 573                             87.54080
## 574                             84.48123
## 575                             75.80476
## 576                             71.99633
## 577                             77.68747
## 578                             70.30445
## 579                             74.95049
## 580                             71.15396
## 581                             74.85165
## 582                             75.26314
## 583                             76.91339
## 584                             85.79335
## 585                             80.85518
## 586                             84.59574
## 587                             88.38748
## 588                             86.73369
## 589                             86.41457
## 590                             84.26103
## 591                             83.65559
## 592                             84.70819
## 593                             84.27259
## 594                             91.77060
## 595                             84.47208
## 596                             77.04129
## 597                             77.01515
## 598                             75.58869
## 599                             69.66089
## 600                             69.00880
## 601                             64.50346
## 602                             74.30459
## 603                             69.62066
## 604                             79.62800
## 605                             72.26135
## 606                             75.24082
## 607                             76.62281
## 608                             81.64100
## 609                             80.32722
## 610                             92.35871
## 611                             82.25820
## 612                             80.26687
## 613                             71.49645
## 614                             84.88933
## 615                             83.03989
## 616                             86.15808
## 617                             80.72471
## 618                             80.58360
## 619                             78.35616
```

```
## 620                    80.58767
## 621                    69.38983
## 622                    74.32166
## 623                    77.14420
## 624                    89.67470
## 625                    88.23286
## 626                    89.92309
## 627                   103.65341
## 628                    95.12974
## 629                    96.54155
## 630                    86.03338
## 631                    87.48121
## 632                    88.59853
## 633                    86.16896
## 634                    87.19663
## 635                    84.66026
## 636                    91.89178
## 637                    95.37146
## 638                   103.81439
## 639                   100.75417
## 640                    96.46755
## 641                    58.82565
## 642                    94.60931
## 643                    81.61702
## 644                    92.16593
## 645                    88.68448
## 646                    73.16406
## 647                    77.79015
## 648                    90.75491
## 649                    91.40286
## 650                   101.24729
## 651                    89.96234
## 652                    84.98862
## 653                    89.41150
## 654                    76.17704
## 655                    87.02351
## 656                    81.76827
## 657                    82.69916
## 658                    82.04981
## 659                    89.26857
## 660                    81.88309
## 661                    88.60227
## 662                    86.08641
## 663                    83.66168
## 664                    67.33915
## 665                    73.03391
## 666                    76.42616
## 667                    76.74552
## 668                    79.52607
## 669                    86.70721
## 670                    85.54581
## 671                    81.45759
## 672                    90.55624
## 673                    85.59157
```

```
## 674                             86.08666
## 675                             83.77530
## 676                             79.11271
## 677                             76.30380
## 678                             85.45075
## 679                             79.13433
## 680                             69.18043
## 681                             77.08416
## 682                             67.00805
## 683                             74.45282
## 684                             74.73076
## 685                             80.04763
## 686                             72.12182
## 687                             82.94771
## 688                             81.34694
## 689                             81.16054
## 690                             74.85504
## 691                             66.27869
## 692                             74.80237
## 693                             73.13457
## 694                             67.08773
## 695                             80.78265
## 696                             73.97263
## 697                             75.80307
## 698                             78.25924
## 699                             74.20176
## 700                             77.22671
## 701                             79.26142
## 702                             84.19971
## 703                             89.59626
## 704                             81.63889
## 705                             83.27089
## 706                             78.28785
## 707                             82.94053
## 708                             83.58153
## 709                             76.37563
## 710                             77.98625
## 711                             89.34058
## 712                             81.40547
## 713                             75.74777
## 714                             85.12236
## 715                             70.60691
## 716                             84.89606
## 717                             86.62123
## 718                             89.55312
## 719                            101.25862
## 720                             93.89528
## 721                             85.60490
## 722                             83.84923
## 723                             87.60087
## 724                             79.62832
## 725                             76.29905
## 726                             79.09720
## 727                             81.15734
```

```
## 728                          84.36782
## 729                          84.27746
## 730                          90.96940
## 731                          81.81429
## 732                          81.34202
## 733                          88.24698
## 734                          85.34721
## 735                          84.26292
## 736                          98.21037
## 737                          90.98895
## 738                          86.53305
## 739                          83.98766
## 740                          80.45527
## 741                          91.70571
## 742                          87.78883
## 743                          78.74698
## 744                          75.25194
## 745                          71.49615
## 746                          79.60788
## 747                          82.50879
## 748                          83.52548
## 749                          66.42791
## 750                          70.51211
## 751                          81.71638
## 752                          67.97215
## 753                          74.85185
## 754                          93.36413
## 755                         103.43174
## 756                          73.23282
## 757                          69.91817
## 758                          84.38538
## 759                          78.51857
## 760                          76.49596
## 761                          67.87962
## 762                          72.75711
## 763                          71.56563
## 764                          71.69259
## 765                          81.74595
## 766                          81.36179
## 767                          92.00141
## 768                          93.18933
## 769                          85.65661
## 770                          90.31655
## 771                          86.83804
## 772                          88.40980
## 773                          80.20965
## 774                          72.32151
## 775                          70.44647
## 776                          82.62767
## 777                          82.23854
## 778                          86.45477
## 779                          88.76188
## 780                          80.01928
## 781                          87.15364
```

```
## 782                         90.49966
## 783                         83.99484
## 784                         78.09105
## 785                         80.82639
## 786                         73.72852
## 787                         70.69014
## 788                         72.61922
## 789                         73.28473
## 790                         78.74572
## 791                         93.68864
## 792                         81.78455
## 793                         90.23493
## 794                         84.19472
## 795                         81.86079
## 796                         85.40427
## 797                         86.52819
## 798                         81.63614
## 799                         77.37618
## 800                         73.64483
## 801                         80.39197
## 802                         81.87908
## 803                         72.62797
## 804                         73.04517
## 805                         78.56846
## 806                         75.08917
## 807                         70.25776
## 808                         71.80706
## 809                         72.18240
## 810                         74.38915
## 811                         70.18816
## 812                         66.98077
## 813                         78.47174
## 814                         76.39887
## 815                         85.83444
## 816                         82.36609
## 817                         81.99555
## 818                         88.35387
## 819                         93.19957
## 820                         85.68540
## 821                         82.39637
## 822                         87.53059
## 823                         81.45814
## 824                         89.03431
## 825                         86.81023
## 826                         81.63018
## 827                         77.46630
## 828                         82.38221
## 829                         72.07170
## 830                         81.47586
## 831                         84.05746
## 832                         98.77947
## 833                         99.38846
## 834                        100.88540
## 835                         93.93740
```

```
## 836                              99.28719
## 837                             100.71500
## 838                              90.46947
## 839                              75.87247
## 840                              72.00580
## 841                              87.36214
## 842                              80.83271
## 843                              80.26024
## 844                              80.03629
## 845                              76.15235
## 846                              86.66554
## 847                              72.88414
## 848                              66.81290
## 849                              63.60122
## 850                              63.45416
## 851                              75.54693
## 852                              79.91606
## 853                             103.22461
## 854                             100.58021
## 855                              94.96774
## 856                             103.48944
## 857                              98.03021
## 858                              81.54804
## 859                              67.28309
## 860                              75.75525
## 861                              81.46042
## 862                              55.04906
## 863                              70.83736
## 864                              93.79849
## 865                              82.57492
## 866                              63.98096
## 867                              79.88604
## 868                              86.18626
## 869                              92.38099
## 870                              91.87309
## 871                              91.89568
## 872                              84.35835
## 873                              89.98057
## 874                              95.84451
## 875                              96.21643
## 876                              81.71168
## 877                              80.79532
## 878                              82.03579
## 879                              78.80142
## 880                              78.98589
## 881                              85.89717
## 882                              62.35801
## 883                              73.02447
## 884                              73.20018
## 885                              67.21956
## 886                              73.33752
## 887                              82.23962
## 888                              74.19379
## 889                             102.79514
```

```
## 890                            84.51132
## 891                            81.73457
## 892                            82.73832
## 893                            86.43914
## 894                            82.36875
## 895                            78.24434
## 896                            86.18695
## 897                            80.62364
## 898                            96.14499
## 899                            94.53938
## 900                            91.92217
## 901                            98.07684
## 902                            84.20501
## 903                            92.04255
## 904                            83.35374
## 905                            78.32133
## 906                            83.89502
## 907                            95.70668
## 908                            98.95877
## 909                            95.02099
## 910                            97.70491
## 911                            88.79770
## 912                            87.01503
## 913                            93.77405
## 914                            80.36583
## 915                            78.59813
## 916                            72.71940
## 917                            73.44546
## 918                            83.08230
## 919                            84.66109
## 920                            83.46122
## 921                            85.73835
## 922                            88.59571
## 923                            78.33340
## 924                            75.67007
## 925                            81.44338
## 926                            84.87941
## 927                            92.86417
## 928                            79.01968
## 929                            80.72064
## 930                            81.12077
## 931                            92.65951
## 932                            87.75298
## 933                            86.42809
## 934                            84.70339
## 935                            77.99316
## 936                            81.29795
## 937                            79.07916
## 938                            78.49956
## 939                            79.95111
## 940                            76.89701
## 941                            82.44670
## 942                            72.46132
## 943                            82.19255
```

```
## 944                                 74.58769
## 945                                 72.37143
## 946                                 76.35055
## 947                                 84.04889
## 948                                 86.09805
## 949                                 88.80999
## 950                                 88.83695
## 951                                 80.62807
## 952                                 86.77966
## 953                                 87.17209
## 954                                 89.24867
## 955                                 82.31457
## 956                                 90.91136
## 957                                 93.48210
## 958                                 84.35778
## 959                                 76.33932
## 960                                 80.89009
## 961                                 82.37508
## 962                                 81.07603
## 963                                 90.80765
## 964                                 87.53160
## 965                                 75.63424
## 966                                 86.65658
## 967                                 80.80470
## 968                                 82.73490
## 969                                 85.29212
## 970                                 79.53801
## 971                                 66.81776
## 972                                 67.43057
## 973                                 82.44908
## 974                                 77.59490
## 975                                 81.40484
## 976                                 78.42875
## 977                                 84.37256
## 978                                 83.27324
## 979                                 86.40346
## 980                                104.54866
## 981                                 72.60307
## 982                                 12.79520
## 983                                 77.75955
## 984                                 77.40356
## 985                                 83.19662
## 986                                 76.47393
## 987                                 80.53532
## 988                                 71.26224
## 989                                 78.39454
## 990                                 83.80685
## 991                                 84.05029
## 992                                 87.19177
## 993                                 83.11745
## 994                                 80.62727
## 995                                 77.43872
## 996                                 86.48362
## 997                                 89.87515
```

```
## 998                            64.38198
## 999                            84.54957
## 1000                           75.01933
## 1001                           64.66463
## 1002                           64.27674
## 1003                           73.31624
## 1004                           78.53816
## 1005                           76.46953
## 1006                           62.96596
## 1007                           76.95265
## 1008                           85.14973
## 1009                           73.90941
## 1010                           81.07319
## 1011                           80.25418
## 1012                           81.90385
## 1013                           80.64928
## 1014                           82.46304
## 1015                           85.43341
## 1016                           85.76962
## 1017                           80.56681
## 1018                           88.61970
## 1019                           80.86555
## 1020                           73.80244
## 1021                           80.65574
## 1022                           82.17007
## 1023                           78.16364
## 1024                           86.46055
## 1025                           86.19108
## 1026                           80.82279
## 1027                           78.01799
## 1028                           79.47738
## 1029                           73.27587
## 1030                           78.68482
## 1031                           82.31318
## 1032                           89.14470
## 1033                           90.91917
## 1034                           84.03309
## 1035                           80.68875
## 1036                           90.67240
## 1037                           88.13552
## 1038                           92.44489
## 1039                           86.23471
## 1040                           83.07098
## 1041                           84.23018
## 1042                           81.17885
## 1043                           81.25842
## 1044                           72.23148
## 1045                           70.62632
## 1046                           68.88836
## 1047                           61.16895
## 1048                           80.04411
## 1049                           48.58736
## 1050                           74.78615
## 1051                           72.27362
```

```
## 1052                        69.92483
## 1053                        78.63857
## 1054                        72.09716
## 1055                        71.85381
## 1056                        76.18837
## 1057                        79.68996
## 1058                        81.99411
## 1059                        89.50301
## 1060                        93.45649
## 1061                        95.01378
## 1062                        87.46678
## 1063                        80.18852
## 1064                        80.14900
## 1065                        78.39498
## 1066                        84.11826
## 1067                        80.64831
## 1068                        86.81757
## 1069                        82.98826
## 1070                        76.09981
## 1071                        79.95818
## 1072                        88.19643
## 1073                        78.33208
## 1074                        84.59843
## 1075                        87.26213
## 1076                        80.01118
## 1077                        90.29308
## 1078                        75.23493
## 1079                        86.70392
## 1080                        73.84854
## 1081                        73.23477
## 1082                        39.65184
## 1083                        39.52768
## 1084                        72.26446
## 1085                        90.15345
## 1086                        61.46690
## 1087                        81.22847
## 1088                        90.91384
## 1089                        93.98991
## 1090                        78.58497
## 1091                        95.76005
## 1092                        83.92764
## 1093                       108.47951
## 1094                        89.37229
## 1095                        89.92951
## 1096                        84.10034
## 1097                        73.44865
## 1098                        97.11571
## 1099                        86.81700
## 1100                        74.41367
## 1101                        96.94630
## 1102                        47.22243
## 1103                        79.76360
## 1104                        68.56332
## 1105                        72.78138
```

```
## 1106                          81.13607
## 1107                          81.37785
## 1108                          80.11446
## 1109                          73.69191
## 1110                          81.58878
## 1111                          75.95082
## 1112                          73.19684
## 1113                          77.84913
## 1114                          82.43758
## 1115                          80.11967
## 1116                          81.84214
## 1117                          86.33281
## 1118                          75.60293
## 1119                          81.89980
## 1120                          78.63579
## 1121                          79.23169
## 1122                          80.51000
## 1123                          80.59576
## 1124                          79.91008
## 1125                          72.59089
## 1126                          79.80484
## 1127                          77.34458
## 1128                          83.93659
## 1129                          88.50735
## 1130                          81.00054
## 1131                          80.25613
## 1132                          82.48203
## 1133                          83.23569
## 1134                          88.31159
## 1135                          81.65745
## 1136                          95.21848
## 1137                          89.68064
## 1138                          89.23232
## 1139                          88.61033
## 1140                          99.08462
## 1141                          91.42910
## 1142                          91.39095
## 1143                          87.18175
## 1144                          82.91470
## 1145                          75.02118
## 1146                          85.27623
## 1147                          82.02620
## 1148                          82.88688
## 1149                          91.66510
## 1150                          78.79512
## 1151                          77.64903
## 1152                          78.74921
## 1153                          79.71059
## 1154                          67.30516
## 1155                          62.30735
## 1156                          84.14282
## 1157                          88.87729
## 1158                          81.36676
## 1159                          77.70468
```

```
## 1160                          83.18373
## 1161                          90.99038
## 1162                          87.47545
## 1163                          80.19431
## 1164                          89.99785
## 1165                          87.47006
## 1166                          91.13616
## 1167                          86.01049
## 1168                          82.48761
## 1169                          90.93424
## 1170                          82.60900
## 1171                          71.83842
## 1172                          83.91271
## 1173                          75.95272
## 1174                          75.96734
## 1175                          70.96463
## 1176                          86.71127
## 1177                          83.49283
## 1178                          73.95786
## 1179                          83.62713
## 1180                          86.25936
## 1181                          80.13238
## 1182                          91.89137
## 1183                          77.82812
## 1184                          91.11693
## 1185                          84.02232
## 1186                          82.21387
## 1187                          84.13363
## 1188                          67.76529
## 1189                          75.24102
## 1190                          87.52787
## 1191                          71.87848
## 1192                          98.57386
## 1193                          84.52714
## 1194                          89.86159
## 1195                          86.41217
## 1196                          62.77960
## 1197                          93.40529
## 1198                          55.91086
## 1199                          56.79606
## 1200                          90.46843
## 1201                          72.86501
## 1202                          65.75041
## 1203                          86.04893
## 1204                          75.16521
## 1205                          73.88338
## 1206                          69.39560
## 1207                          73.94204
## 1208                          78.96121
## 1209                          84.99068
## 1210                          52.87414
## 1211                         -14.86831
## 1212                          76.25789
## 1213                          75.50743
```

```
## 1214                            67.16884
## 1215                            66.90743
## 1216                            78.73679
## 1217                            70.60007
## 1218                            71.04719
## 1219                            76.07489
## 1220                            86.40975
## 1221                            90.47891
## 1222                            84.40704
## 1223                            74.31993
## 1224                            89.72958
## 1225                            87.90126
## 1226                            79.67031
## 1227                            77.31396
## 1228                            89.91889
## 1229                            79.76720
## 1230                            79.69541
## 1231                            82.23650
## 1232                            84.97907
## 1233                            76.19720
## 1234                            79.83030
## 1235                            86.14125
## 1236                            74.95494
## 1237                            75.20767
## 1238                            85.68961
## 1239                            70.88459
## 1240                            73.86408
## 1241                            74.72470
## 1242                            81.71808
## 1243                            75.74775
## 1244                            76.28133
## 1245                            76.56413
## 1246                            77.13512
## 1247                            78.65494
## 1248                            63.92884
## 1249                            60.69191
## 1250                            87.35683
## 1251                            76.72049
## 1252                            59.58159
## 1253                            78.27593
## 1254                            79.31386
## 1255                            90.08760
## 1256                            80.81078
## 1257                            75.72528
## 1258                            78.00031
## 1259                            75.66633
## 1260                            71.63302
## 1261                            76.17954
## 1262                            78.85612
## 1263                            90.41550
## 1264                            80.06320
## 1265                            75.46127
## 1266                            77.64302
## 1267                            90.60779
```

```
## 1268                          93.69729
## 1269                          96.06713
## 1270                          91.70541
## 1271                          86.69148
## 1272                          82.31295
## 1273                          95.63714
## 1274                          90.44655
## 1275                          91.68412
## 1276                          95.33996
## 1277                          84.19341
## 1278                          89.10651
## 1279                          87.28543
## 1280                          91.92978
## 1281                          82.29826
## 1282                          76.67050
## 1283                          80.45691
## 1284                          76.69684
## 1285                          79.96420
## 1286                          74.58338
## 1287                          81.82592
## 1288                          71.73087
## 1289                          75.14084
## 1290                          76.98514
## 1291                          76.80357
## 1292                          77.25227
## 1293                          78.74897
## 1294                          76.08229
## 1295                          71.49812
## 1296                          75.21147
## 1297                          72.09172
## 1298                          71.92088
## 1299                          74.29483
## 1300                          77.71560
## 1301                          84.87340
## 1302                          83.59490
## 1303                          84.39328
## 1304                          79.46376
## 1305                          75.74019
## 1306                          70.60465
## 1307                          83.90743
## 1308                          83.81032
## 1309                          82.80087
## 1310                          71.25864
## 1311                          84.54443
## 1312                          82.65051
## 1313                          83.52874
## 1314                          82.23817
## 1315                          86.88477
## 1316                          74.56154
## 1317                          67.27121
## 1318                          79.27253
## 1319                          78.10627
## 1320                          81.04236
## 1321                          87.48365
```

```
## 1322                    86.72669
## 1323                    87.24697
## 1324                    80.38180
## 1325                    90.09772
## 1326                    86.48324
## 1327                    82.40340
## 1328                    87.98448
## 1329                    85.22402
## 1330                    93.55616
## 1331                    81.51782
## 1332                    85.66684
## 1333                    81.10750
## 1334                    86.75449
## 1335                    84.73531
## 1336                    90.88728
## 1337                    85.83583
## 1338                    78.76364
## 1339                    93.21848
## 1340                    72.08865
## 1341                    65.31421
## 1342                    68.13908
## 1343                    88.18541
## 1344                    75.38651
## 1345                    39.30175
## 1346                    72.33055
## 1347                    66.39322
## 1348                    51.92644
## 1349                    77.57300
## 1350                    55.51055
## 1351                    92.51743
## 1352                    70.66654
## 1353                    54.83401
## 1354                    54.62291
## 1355                    63.54168
## 1356                    63.12299
## 1357                    62.31852
## 1358                    73.09667
## 1359                    83.48429
## 1360                    70.33134
## 1361                    74.35867
## 1362                    71.37928
## 1363                    76.58367
## 1364                    80.17380
## 1365                    74.70983
## 1366                    74.71973
## 1367                    75.44644
## 1368                    80.67446
## 1369                    72.90782
## 1370                    72.68845
## 1371                    78.14078
## 1372                    85.63097
## 1373                    85.89099
## 1374                    91.24140
## 1375                    86.85887
```

```
## 1376                       80.84092
## 1377                       86.25345
## 1378                       81.56670
## 1379                       72.18818
## 1380                       75.01936
## 1381                       70.71780
## 1382                       79.16251
## 1383                       76.89407
## 1384                       80.09622
## 1385                       78.20693
## 1386                       96.48085
## 1387                       88.02606
## 1388                       76.97589
## 1389                       78.33184
## 1390                       69.00315
## 1391                       75.44951
## 1392                       83.59121
## 1393                       91.03650
## 1394                       96.85602
## 1395                       43.67512
## 1396                       62.04538
## 1397                       55.07884
## 1398                       79.74197
## 1399                       69.45314
## 1400                       76.53649
## 1401                       79.68342
## 1402                       88.81726
## 1403                       64.54058
## 1404                       60.94187
## 1405                       92.82356
## 1406                       89.13504
## 1407                       68.33606
## 1408                       70.52905
## 1409                       77.25037
## 1410                       74.18765
## 1411                       77.59405
## 1412                       71.52221
## 1413                       71.98010
## 1414                       78.57186
## 1415                       83.22347
## 1416                       93.39679
## 1417                       91.50523
## 1418                       97.07548
## 1419                       93.35404
## 1420                       85.68483
## 1421                       91.98329
## 1422                      103.56845
## 1423                       92.43988
## 1424                       93.40845
## 1425                      102.19696
## 1426                      101.20930
## 1427                       93.70389
## 1428                       93.42425
## 1429                       99.68818
```

```
## 1430                   84.70107
## 1431                   83.68351
## 1432                   82.49972
## 1433                   80.46820
## 1434                   81.63863
## 1435                   78.82205
## 1436                   76.33139
## 1437                   89.16750
## 1438                   84.71805
## 1439                   95.45757
## 1440                   83.08476
## 1441                   80.02298
## 1442                   85.73764
## 1443                   81.73079
## 1444                   85.90304
## 1445                   83.90321
## 1446                   80.43332
## 1447                   77.81319
## 1448                   81.28784
## 1449                   87.00260
## 1450                   86.27996
## 1451                   80.49646
## 1452                   82.64941
## 1453                   68.40495
## 1454                   73.97850
## 1455                   65.11257
## 1456                   67.00220
## 1457                   72.77595
## 1458                   82.64995
## 1459                   80.54151
## 1460                   71.47096
## 1461                   76.16283
## 1462                   79.38334
## 1463                   82.82390
## 1464                   90.79761
## 1465                   92.57407
## 1466                   89.66948
## 1467                   90.42414
## 1468                   81.43143
## 1469                   84.69947
## 1470                   86.15017
## 1471                   82.11231
## 1472                   89.47976
## 1473                   89.87134
## 1474                   88.14762
## 1475                   84.24673
## 1476                   82.87699
## 1477                   76.08768
## 1478                   86.77008
## 1479                   95.37445
## 1480                   89.66387
## 1481                   95.17080
## 1482                   92.91091
## 1483                   99.90620
```

```
## 1484                       96.07490
## 1485                       92.02609
## 1486                       89.56345
## 1487                       90.11809
## 1488                       92.06957
## 1489                       92.75542
## 1490                       93.40726
## 1491                       95.36751
## 1492                       83.14946
## 1493                       90.32770
## 1494                       79.10407
## 1495                       75.15981
## 1496                       85.45343
## 1497                       84.91113
## 1498                       83.94183
## 1499                       70.26753
## 1500                       94.48332
## 1501                      103.28924
## 1502                      121.45508
## 1503                       91.39908
## 1504                       60.27100
## 1505                       62.30368
## 1506                       73.60100
## 1507                       59.16067
## 1508                       66.35067
## 1509                       63.55810
## 1510                       74.54077
## 1511                       78.49194
## 1512                       76.06463
## 1513                       77.49844
## 1514                       90.41574
## 1515                       88.73248
## 1516                       97.92793
## 1517                       95.88305
## 1518                       88.32950
## 1519                       99.04154
## 1520                       88.86333
## 1521                       84.02294
## 1522                       81.27678
## 1523                       77.26068
## 1524                       80.14478
## 1525                       83.86352
## 1526                       74.56434
## 1527                       77.98810
## 1528                       72.07848
## 1529                       67.24270
## 1530                       75.02149
## 1531                       68.31295
## 1532                       71.89396
## 1533                       82.00599
## 1534                       78.14076
## 1535                       77.04762
## 1536                       76.30899
## 1537                       79.61284
```

```
## 1538                      66.90099
## 1539                      74.96476
## 1540                      72.20948
## 1541                      74.32697
## 1542                      73.55172
## 1543                      72.41824
## 1544                      87.70961
## 1545                      76.75329
## 1546                      70.38464
## 1547                      75.46643
## 1548                      68.11055
## 1549                      71.35640
## 1550                      74.23048
## 1551                      80.20165
## 1552                      80.11817
## 1553                      73.28357
## 1554                      83.18685
## 1555                      79.93114
## 1556                      87.51005
## 1557                      76.08595
## 1558                      71.78502
## 1559                      72.31305
## 1560                      90.87099
## 1561                      85.20843
## 1562                      81.57663
## 1563                      85.98846
## 1564                      82.60436
## 1565                      87.31671
## 1566                      85.08796
## 1567                      83.97403
## 1568                      88.24729
## 1569                      83.19463
## 1570                      87.12874
## 1571                      82.52175
## 1572                      82.86340
## 1573                      84.54527
## 1574                      84.15981
## 1575                      80.79247
## 1576                      78.03604
## 1577                      85.77454
## 1578                      85.08992
## 1579                      82.94755
## 1580                      78.74724
## 1581                      81.91254
## 1582                      80.73980
## 1583                      83.25665
## 1584                      44.89652
## 1585                      80.26286
## 1586                      80.36965
## 1587                      89.09074
## 1588                      77.93892
## 1589                      83.00193
## 1590                      95.18983
## 1591                      95.13485
```

```
## 1592                              51.36249
## 1593                              79.80377
## 1594                              63.95358
## 1595                              71.26201
## 1596                              64.04355
## 1597                              90.35811
## 1598                              55.44163
## 1599                              77.13828
## 1600                              89.22636
## 1601                              72.26745
## 1602                              80.79500
## 1603                             111.81219
## 1604                             131.29061
## 1605                              95.94909
## 1606                              93.89723
## 1607                              80.09299
## 1608                              90.77829
## 1609                              88.18465
## 1610                              83.06276
## 1611                              64.85960
## 1612                              72.44562
## 1613                              75.09178
## 1614                              75.61855
## 1615                              87.51030
## 1616                              83.99103
## 1617                              76.53121
## 1618                              78.84924
## 1619                              78.87754
## 1620                              83.79980
## 1621                              76.38788
## 1622                              72.62525
## 1623                              69.42170
## 1624                              72.91944
## 1625                              66.78497
## 1626                              69.41925
## 1627                              71.43095
## 1628                              80.06691
## 1629                              77.63455
## 1630                              78.05276
## 1631                              84.59928
## 1632                              76.30619
## 1633                              81.14714
## 1634                              74.17113
## 1635                              98.28792
## 1636                              89.31541
## 1637                              76.32556
## 1638                              88.61179
## 1639                              71.71472
## 1640                              79.29136
## 1641                              78.90375
## 1642                              66.33320
## 1643                              72.27326
## 1644                              67.63748
## 1645                              69.61910
```

```
## 1646                           61.72377
## 1647                           72.75563
## 1648                           74.32216
## 1649                           75.69109
## 1650                           77.80176
## 1651                           78.91773
## 1652                           83.45507
## 1653                           83.02456
## 1654                           80.42750
## 1655                           80.44534
## 1656                           82.08588
## 1657                           81.62892
## 1658                           70.80280
## 1659                           66.90872
## 1660                           67.91063
## 1661                           79.47662
## 1662                           73.89015
## 1663                           73.37765
## 1664                           68.74694
## 1665                           65.31852
## 1666                           70.22005
## 1667                           69.71952
## 1668                           70.00281
## 1669                           70.87700
## 1670                           77.73193
## 1671                           82.37303
## 1672                           86.69303
## 1673                           92.54408
## 1674                           84.69542
## 1675                           90.04192
## 1676                           87.44192
## 1677                           91.57678
## 1678                           76.96811
## 1679                           79.81322
## 1680                           83.89263
## 1681                           70.80974
## 1682                           78.23753
## 1683                           80.94462
## 1684                           76.91876
## 1685                           79.40930
## 1686                           89.91181
## 1687                           78.26627
## 1688                           80.49813
## 1689                           83.10824
## 1690                           90.15640
## 1691                           80.96437
## 1692                           85.02245
## 1693                           83.97359
## 1694                           82.13321
## 1695                           89.93923
## 1696                           92.08662
## 1697                           87.54202
## 1698                           58.62330
## 1699                           82.99815
```

```
## 1700                    78.75513
## 1701                    83.27171
## 1702                    80.35481
## 1703                    62.15965
## 1704                    85.67398
## 1705                    64.52600
## 1706                    70.19915
## 1707                    56.72306
## 1708                    47.10289
## 1709                    71.50721
## 1710                   109.16681
## 1711                    89.19625
## 1712                    98.45044
## 1713                    85.02313
## 1714                    72.13163
## 1715                    78.74191
## 1716                    89.75651
## 1717                    94.70675
## 1718                    99.68939
## 1719                    82.20003
## 1720                    94.01725
## 1721                    94.77412
## 1722                   102.23011
## 1723                   103.98130
## 1724                   103.97227
## 1725                    79.13519
## 1726                    95.76770
## 1727                    85.18453
## 1728                    73.49835
## 1729                    77.83862
## 1730                    74.56013
## 1731                    68.28687
## 1732                    81.68564
## 1733                    84.11331
## 1734                    85.57622
## 1735                    91.37602
## 1736                   104.24516
## 1737                    95.52619
## 1738                    91.22868
## 1739                    94.78600
## 1740                    83.55382
## 1741                    93.48625
## 1742                    96.75604
## 1743                   100.40223
## 1744                    90.73385
## 1745                    74.76422
## 1746                    85.65299
## 1747                    85.31663
## 1748                    90.86962
## 1749                    90.58249
## 1750                    89.41231
## 1751                    86.53021
## 1752                    84.22554
## 1753                    79.53790
```

```
## 1754                    81.29795
## 1755                    80.03760
## 1756                    73.64911
## 1757                    77.50623
## 1758                    85.36075
## 1759                    82.71380
## 1760                    77.19572
## 1761                    84.79545
## 1762                    85.59784
## 1763                    81.54402
## 1764                    82.54350
## 1765                    76.13430
## 1766                    76.28119
## 1767                    72.34871
## 1768                    73.94165
## 1769                    76.00197
## 1770                    74.62276
## 1771                    74.06178
## 1772                    74.96876
## 1773                    75.72543
## 1774                    67.22022
## 1775                    71.07864
## 1776                    72.21657
## 1777                    77.73381
## 1778                    79.94965
## 1779                    76.24118
## 1780                    80.02158
## 1781                    84.87503
## 1782                    77.22274
## 1783                    76.64299
## 1784                    81.81345
## 1785                    78.53895
## 1786                    83.84706
## 1787                    84.17435
## 1788                    88.62038
## 1789                    87.14151
## 1790                    80.59349
## 1791                    86.70901
## 1792                    82.57953
## 1793                    75.99284
## 1794                    79.51426
## 1795                    85.35239
## 1796                    77.80860
## 1797                    84.08457
## 1798                    87.79439
## 1799                    83.66026
## 1800                    82.77320
## 1801                    69.85413
## 1802                    81.41726
## 1803                    79.75396
## 1804                    76.23201
## 1805                    69.58414
## 1806                    68.00580
## 1807                    83.14810
```

```
## 1808                          71.83989
## 1809                          73.68056
## 1810                         103.55689
## 1811                          98.56856
## 1812                          80.71717
## 1813                         104.74975
## 1814                          76.82983
## 1815                         106.74587
## 1816                          85.17167
## 1817                          79.67060
## 1818                          81.68417
## 1819                          94.25169
## 1820                          91.36705
## 1821                          72.34573
## 1822                          61.49556
## 1823                          82.18661
## 1824                          69.23555
## 1825                          18.80203
## 1826                          62.18674
## 1827                          75.93525
## 1828                          62.03754
## 1829                          93.21808
## 1830                          79.77183
## 1831                          60.32556
## 1832                          71.71609
## 1833                          65.12902
## 1834                          65.53250
## 1835                          67.78414
## 1836                          69.94814
## 1837                          67.01801
## 1838                          73.00962
## 1839                          77.85395
## 1840                          74.24686
## 1841                          87.66879
## 1842                          72.43845
## 1843                          81.28324
## 1844                          83.62708
## 1845                          84.18550
## 1846                          76.45624
## 1847                          87.70459
## 1848                          76.98064
## 1849                          77.46274
## 1850                          82.47850
## 1851                          77.16459
## 1852                          79.46878
## 1853                          75.51107
## 1854                          81.71258
## 1855                          84.03095
## 1856                          87.19759
## 1857                          86.46741
## 1858                          79.04322
## 1859                          80.45795
## 1860                          80.67275
## 1861                          74.92599
```

```
## 1862                          81.86840
## 1863                          82.58899
## 1864                          86.98529
## 1865                          77.36641
## 1866                          74.80178
## 1867                          85.82635
## 1868                          72.91180
## 1869                          78.06480
## 1870                          79.96291
## 1871                          71.11005
## 1872                          83.13746
## 1873                          81.40171
## 1874                          72.26757
## 1875                          90.61998
## 1876                          77.05026
## 1877                          76.36588
## 1878                          82.04913
## 1879                          77.77679
## 1880                          80.78692
## 1881                          83.66812
## 1882                          84.24362
## 1883                          92.65908
## 1884                          94.55569
## 1885                          92.01758
## 1886                          89.81358
## 1887                          89.46349
## 1888                          89.99140
## 1889                         100.67663
## 1890                          92.45367
## 1891                          87.01803
## 1892                          84.41864
## 1893                          79.65028
## 1894                          86.82086
## 1895                          85.55919
## 1896                         108.70581
## 1897                          71.35281
## 1898                          99.26440
## 1899                          74.84199
## 1900                          94.23312
## 1901                          76.83131
## 1902                          82.83056
## 1903                          70.57475
## 1904                         102.51035
## 1905                         102.07675
## 1906                          89.96004
## 1907                         100.36135
## 1908                         101.73733
## 1909                          77.61398
## 1910                          78.26324
## 1911                          70.60512
## 1912                          64.37255
## 1913                          55.67408
## 1914                          93.81420
## 1915                          95.79974
```

```
## 1916                            117.11241
## 1917                            107.12225
## 1918                             96.03197
## 1919                             89.02749
## 1920                             87.34414
## 1921                             97.70865
## 1922                             92.72954
## 1923                             89.28686
## 1924                             79.74015
## 1925                             71.66500
## 1926                             81.37575
## 1927                             79.35560
## 1928                             79.84553
## 1929                             79.34939
## 1930                             80.31298
## 1931                             97.06207
## 1932                             96.66579
## 1933                             92.64241
## 1934                             86.89358
## 1935                             79.64500
## 1936                             88.82754
## 1937                             88.17389
## 1938                             95.50298
## 1939                            103.52014
## 1940                             92.73955
## 1941                             81.72361
## 1942                             75.96567
## 1943                             80.55155
## 1944                             91.15125
## 1945                             82.26535
## 1946                             83.12106
## 1947                             81.62433
## 1948                             80.64365
## 1949                             84.82151
## 1950                             77.83518
## 1951                             83.58269
## 1952                             77.38139
## 1953                             81.54834
## 1954                             88.87408
## 1955                             83.67142
## 1956                             89.89394
## 1957                             86.76129
## 1958                             86.86648
## 1959                             86.24192
## 1960                             78.85478
## 1961                             86.77730
## 1962                             81.78580
## 1963                             81.89456
## 1964                             76.35250
## 1965                             78.76773
## 1966                             79.96449
## 1967                             81.44875
## 1968                             80.15261
## 1969                             85.96076
```

```
## 1970                        85.08263
## 1971                        78.84692
## 1972                        82.09936
## 1973                        76.16900
## 1974                        74.11347
## 1975                        73.15330
## 1976                        75.28360
## 1977                        84.13038
## 1978                        75.71428
## 1979                        78.71630
## 1980                        87.68198
## 1981                        74.60858
## 1982                        79.77265
## 1983                        71.22685
## 1984                        78.94526
## 1985                        79.51838
## 1986                        77.52557
## 1987                        83.26182
## 1988                        82.12379
## 1989                        70.66966
## 1990                        76.39111
## 1991                        80.75423
## 1992                        78.00667
## 1993                        79.21319
## 1994                        85.70446
## 1995                        70.03010
## 1996                        86.60789
## 1997                        82.60220
## 1998                        79.34914
## 1999                        77.30414
## 2000                        83.43552
## 2001                        87.93789
## 2002                        88.28898
## 2003                        91.14773
## 2004                        85.51529
## 2005                        86.78964
## 2006                        83.95283
## 2007                        89.17882
## 2008                        77.62991
## 2009                        83.86297
## 2010                        71.90911
## 2011                        88.12751
## 2012                        89.40111
## 2013                        76.00431
## 2014                        44.65090
## 2015                        46.54715
## 2016                        72.01402
## 2017                        69.31108
## 2018                        89.11690
## 2019                        84.66067
## 2020                        95.25301
## 2021                        80.80391
## 2022                       112.89646
## 2023                        83.81413
```

```
## 2024                        86.45394
## 2025                        82.21161
## 2026                        87.36365
## 2027                        68.75727
## 2028                        90.97261
## 2029                        90.23974
## 2030                        77.58696
## 2031                        80.29470
## 2032                        63.83707
## 2033                        89.95607
## 2034                        96.20271
## 2035                        84.88836
## 2036                        67.98186
## 2037                        56.19358
## 2038                        77.59880
## 2039                        83.51087
## 2040                        70.02379
## 2041                        46.75252
## 2042                        48.84109
## 2043                        70.56914
## 2044                        78.00975
## 2045                        79.51433
## 2046                        79.37326
## 2047                        76.97936
## 2048                        75.51561
## 2049                        79.16711
## 2050                        67.16412
## 2051                        71.49356
## 2052                        71.36621
## 2053                        84.91706
## 2054                        91.95770
## 2055                        92.40683
## 2056                        85.42620
## 2057                        83.84230
## 2058                        88.43629
## 2059                        79.00310
## 2060                        92.33296
## 2061                        90.42476
## 2062                        92.82913
## 2063                        82.86310
## 2064                        77.73821
## 2065                        85.10907
## 2066                        88.49718
## 2067                        85.78150
## 2068                        85.23119
## 2069                        87.19529
## 2070                        83.67927
## 2071                        86.51123
## 2072                        88.66307
## 2073                        82.48833
## 2074                        82.80572
## 2075                        80.49059
## 2076                        79.93105
## 2077                        87.32657
```

```
## 2078                          85.58132
## 2079                          86.54277
## 2080                          76.20930
## 2081                          79.64144
## 2082                          79.08269
## 2083                          84.14945
## 2084                          86.03111
## 2085                          79.03993
## 2086                          81.12575
## 2087                          85.14312
## 2088                          76.40638
## 2089                          79.42712
## 2090                          77.15059
## 2091                          76.08445
## 2092                          82.99992
## 2093                          84.84673
## 2094                          77.75520
## 2095                          79.43344
## 2096                          74.33193
## 2097                          83.18418
## 2098                          74.44958
## 2099                          77.68838
## 2100                          84.93724
## 2101                          87.40402
## 2102                          77.90750
## 2103                          76.85843
## 2104                          81.93931
## 2105                          82.36836
## 2106                          75.46751
## 2107                          82.17710
## 2108                          71.89975
## 2109                          85.09388
## 2110                          85.93681
## 2111                          85.26535
## 2112                          85.48008
## 2113                          78.69280
## 2114                          94.46427
## 2115                          77.04686
## 2116                          89.85809
## 2117                          85.60405
## 2118                          83.53485
## 2119                          86.96302
## 2120                          85.28335
## 2121                          88.09081
## 2122                          83.56187
## 2123                          81.66703
## 2124                          65.89695
## 2125                          83.34374
## 2126                          80.16882
## 2127                          85.28029
## 2128                          84.29207
## 2129                          89.51183
## 2130                          84.20566
## 2131                          83.57110
```

```
## 2132                      92.41966
## 2133                      87.59234
## 2134                      80.84726
## 2135                      81.04132
## 2136                      50.06806
## 2137                      62.07784
## 2138                      79.56881
## 2139                      77.67244
## 2140                      75.80818
## 2141                      78.69893
## 2142                      73.06391
## 2143                      72.82676
## 2144                      80.52420
## 2145                      82.73718
## 2146                      84.41271
## 2147                      79.09130
## 2148                      70.81323
## 2149                      78.01184
## 2150                      63.94425
## 2151                      66.80312
## 2152                      66.48291
## 2153                      67.88544
## 2154                      61.94055
## 2155                      65.09533
## 2156                      80.28228
## 2157                      75.04591
## 2158                      65.12067
## 2159                      76.08670
## 2160                      81.62543
## 2161                      77.37865
## 2162                      77.12585
## 2163                      89.67867
## 2164                      86.59012
## 2165                      86.13036
## 2166                      79.55490
## 2167                      73.40650
## 2168                      81.35782
## 2169                      83.23258
## 2170                      84.67323
## 2171                      85.59296
## 2172                      79.71178
## 2173                      80.36302
## 2174                      76.87710
## 2175                      87.08616
## 2176                      74.59007
## 2177                      89.81382
## 2178                      80.33642
## 2179                      96.02359
## 2180                      80.99649
## 2181                      92.60314
## 2182                      96.09116
## 2183                      85.57263
## 2184                      86.80469
## 2185                      85.41643
```

```
## 2186                          84.68321
## 2187                          83.13571
## 2188                          85.69452
## 2189                          79.62012
## 2190                          86.87461
## 2191                          70.03476
## 2192                          75.02736
## 2193                          68.03381
## 2194                          70.89891
## 2195                          62.15289
## 2196                          80.61343
## 2197                          92.02857
## 2198                          90.84946
## 2199                          87.57983
## 2200                          89.27920
## 2201                          90.54054
## 2202                          85.18860
## 2203                          83.11234
## 2204                          90.21774
## 2205                          83.17718
## 2206                          93.67170
## 2207                          93.52825
## 2208                          85.33928
## 2209                          80.60595
## 2210                          78.60144
## 2211                          76.22472
## 2212                          90.46434
## 2213                          87.64183
## 2214                          86.19946
## 2215                          81.10451
## 2216                          79.15053
## 2217                          81.20221
## 2218                          86.83673
## 2219                         101.60105
## 2220                          72.20146
## 2221                          79.96315
## 2222                          83.75027
## 2223                          73.32756
## 2224                          61.27572
## 2225                          67.42931
## 2226                          75.88428
## 2227                          88.51002
## 2228                          89.67653
## 2229                          88.46107
## 2230                          74.46896
## 2231                          78.20332
## 2232                          46.63564
## 2233                          59.20192
## 2234                          65.50040
## 2235                          37.78302
## 2236                          69.68197
## 2237                          55.35096
## 2238                          65.34020
## 2239                          40.85866
```

```
## 2240                          74.82410
## 2241                          87.04544
## 2242                          64.74947
## 2243                          64.40598
## 2244                          69.42575
## 2245                          69.80910
## 2246                          79.15849
## 2247                          69.42327
## 2248                          63.74421
## 2249                          84.05834
## 2250                          73.41059
## 2251                          84.61742
## 2252                          90.25716
## 2253                          85.04350
## 2254                          89.54356
## 2255                          87.65199
## 2256                          77.90718
## 2257                          80.27853
## 2258                          84.84810
## 2259                          84.67466
## 2260                          78.94493
## 2261                          79.70711
## 2262                          87.93593
## 2263                          80.34373
## 2264                          91.78796
## 2265                          77.09548
## 2266                          81.08794
## 2267                          71.90745
## 2268                          79.29134
## 2269                          78.28669
## 2270                          73.41430
## 2271                          78.85509
## 2272                          78.55816
## 2273                          76.03423
## 2274                          70.06265
## 2275                          82.28133
## 2276                          46.35624
```