

March ACR

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Libraries

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
## The following object is masked from 'package:base':
##
##     date
```

Data

Read Data In

The data is a CSV file that is created by saving the ACR tab of the FPA Excel Workbook.

```
ACR.raw <- read.csv(file = "../data/ACR.csv",
                    stringsAsFactors = FALSE)
name <- c("SQA",
          "Application",
          "CRNumber",
          "CRDate",
          "CRApproved",
          "IENumber",
          "IEDate",
          "IEApproved",
          "Reason",
          "Comments")
names(ACR.raw) <- name
rm(name)
ACR <- ACR.raw
```

Format the Data

Convert to Factor

```
ACR$SQA <- as.factor(ACR$SQA)
ACR$Application <- as.factor(ACR$Application)
ACR$CRApproved <- as.factor(ACR$CRApproved)
ACR$IEApproved <- as.factor(ACR$IEApproved)
levels(ACR$IEApproved)[1] <- NA
ACR$Reason <- as.factor(ACR$Reason)
levels(ACR$Reason)[1] <- NA
```

Convert to Dates

```
ACR$CRDate <- as.Date(ACR$CRDate, format = "%d-%b-%y")
ACR$IEDate <- as.Date(ACR$IEDate, format = "%d-%b-%y")
ACR$CRmonth <- lubridate::month(ACR$CRDate, label = TRUE)
ACR$CRyear <- lubridate::year(ACR$CRDate)
ACR$IEMonth <- lubridate::month(ACR$IEDate, label = TRUE)
ACR$IEyear <- lubridate::year(ACR$IEDate)
```

Structure of The Data

```
str(ACR)
```

```
## 'data.frame': 421 obs. of 14 variables:
## $ SQA : Factor w/ 6 levels "Beilah","Liz",...: 3 3 3 6 6 2 2 3 3 6 ...
## $ Application: Factor w/ 21 levels "", "ADDCOM", "AFMS",...: 6 6 6 10 10 10 10 6 3 10 ...
## $ CRNumber : chr "CSIT0824" "CSIT07991" "CSIT08209" "17-23207" ...
## $ CRDate : Date, format: "2016-08-15" "2016-11-30" ...
## $ CRApproved : Factor w/ 4 levels "", "A", "A-FP",...: 2 2 2 3 3 3 3 2 2 3 ...
## $ IENumber : chr "CSIT0824" "CSIT07991" "CSIT08209" "17-29297" ...
## $ IEDate : Date, format: "2018-10-08" "2018-10-08" ...
## $ IEApproved : Factor w/ 3 levels "A", "A-FP", "D": 1 1 1 2 2 2 2 1 2 2 ...
## $ Reason : Factor w/ 7 levels "Inaccurate information",...: NA NA NA NA NA NA NA NA NA ...
## $ Comments : chr "" "Cancellation" "" "I&E by Nick" ...
## $ CRmonth : Ord.factor w/ 12 levels "Jan"<"Feb"<"Mar"<...: 8 11 3 8 8 8 8 10 12 4 ...
```

```
## $ CYear      : num  2016 2016 2017 2017 2017 ...
## $ IEmonth    : Ord.factor w/ 12 levels "Jan"<"Feb"<"Mar"<...: 10 10 10 1 1 1 1 10 1 1 ...
## $ IYear      : num  2018 2018 2018 2019 2019 ...
```

Metrics

Select Data

Data is selected first for the Month and Year of interest. The selection is based on both the CR and I&E dates. This selection is used as a master dataframe. Two additional dataframes are produced the first of the approval of the CR in the month and the second for the approval of the I&E in the month.

```
#create master dataframe
work <- subset(ACR,
               subset = (CRmonth == "Mar" & CYear == 2019) |
               (subset = IEmonth == "Mar" & IYear == 2019))
# Create the CR data frame
workCR <- subset(ACR,
                 subset = CRmonth == "Mar" & CYear == 2019)
# create the IE data frame.
workIE <- subset(ACR,
                 subset = IEmonth == "Mar" & IYear == 2019)
```

Counts

Data Changes (CR) Request Approved

```
nrow(subset(workCR,
             subset = (CRAproved == "A" | CRAproved == "A-FP")))
```

```
## [1] 48
```

Data Change Request Disapproved

```
nrow(subset(workCR,
             subset = (CRAproved == "D")))
```

```
## [1] 3
```

Implementation and Effectivity (IE) Approved

```
nrow(subset(workIE,
             subset = (IEAproved == "A" | IEAproved == "A-FP")))
```

```
## [1] 57
```

IE Disapproved

```
nrow(subset(workIE,
             subset = (CRAproved == "D")))
```

```
## [1] 0
```

First pass acceptance

CR

```
nrow(subset(workCR,
             subset = CRApproved == "A-FP")) /
nrow(workCR) * 100
```

```
## [1] 92.15686
```

IE

```
nrow(subset(workIE,
             subset = IEApproved == "A-FP")) /
nrow(workIE) * 100
```

```
## [1] 93.33333
```

Total Process

This is the number of data changes that had both the CR and IE approved on first pass.

```
nrow(subset(work,
             subset = (CRApproved == "A-FP" & IEApproved == "A-FP"))) /
nrow(work) * 100
```

```
## [1] 49.48454
```

Number by Application

Opened

```
table(subset(workCR,
             subset = CRApproved != "D")$Application)
```

```
##
##
##          0
##      ADDCOM
##          3
##      AFMS
##          4
##      ALMS
##         18
##      APLM
##          0
##      CMSNext
##         17
##      DaVinci
##          0
##      DMS
##          0
## E-labeling Web Package Insert Retrieval
##          0
##      eNovator
##          0
```

```
##          GDSN/GS1
##          0
##          iQ
##          4
##          Metrics Library
##          0
##          MSS
##          2
##          NPV
##          0
##          PCN/SCN
##          0
##          PEAR
##          0
##          QPI
##          0
##          RSLMS
##          0
##          TODS
##          0
##          WWLIMS
##          0
```

Completed

```
table(subset(workIE,
             subset = IEApproved != "D")$Application)
```

```
##
##
##          0
##          ADDCOM
##          4
##          AFMS
##          2
##          ALMS
##          14
##          APLM
##          1
##          CMSNext
##          25
##          DaVinci
##          0
##          DMS
##          0
## E-labeling Web Package Insert Retrieval
##          0
##          eNovator
##          1
##          GDSN/GS1
##          0
##          iQ
##          2
##          Metrics Library
```

```
##          0
##          MSS
##          5
##          NPV
##          2
##          PCN/SCN
##          0
##          PEAR
##          0
##          QPI
##          0
##          RSLMS
##          0
##          TODS
##          1
##          WWLIMS
##          0
```

Total

```
table(subset(workCR,
  subset = CRApproved != "D")$Application) +
  table(subset(workIE,
    subset = IEApproved != "D")$Application)
```

```
##
##
##          0
##          ADDCOM
##          7
##          AFMS
##          6
##          ALMS
##          32
##          APLM
##          1
##          CMSNext
##          42
##          DaVinci
##          0
##          DMS
##          0
## E-labeling Web Package Insert Retrieval
##          0
##          eNovator
##          1
##          GDSN/GS1
##          0
##          iQ
##          6
##          Metrics Library
##          0
##          MSS
##          7
```

```
##          NPV
##          2
##      PCN/SCN
##          0
##          PEAR
##          0
##          QPI
##          0
##          RSLMS
##          0
##          TODS
##          1
##          WVLIMS
##          0
```

Time to Complete A Data Change

This is the interval between CR approval and IE approval

```
# select records that have been approved (both CR adn IE)
work.all <- subset(ACR,
                  subset = ((CRApproved == "A" | CRApproved == "A-FP") &
                           (IEApproved == "A" | IEApproved == "A-FP")))
# now further select records from above that were completed in the correct month
work.all <- subset(work.all,
                  subset = (IEmonth == "Mar" & IEyear == 2019))
# compute interval
work.all$Interval <- as.numeric(work.all$IEDate - work.all$CRDate)
# results
nrow(work.all)
```

```
## [1] 57
```

```
summary(work.all$Interval)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      2.00  16.00   36.00   53.04   69.00   318.00
```

```
sd(work.all$Interval)
```

```
## [1] 60.62
```

```
table(work.all$Interval)
```

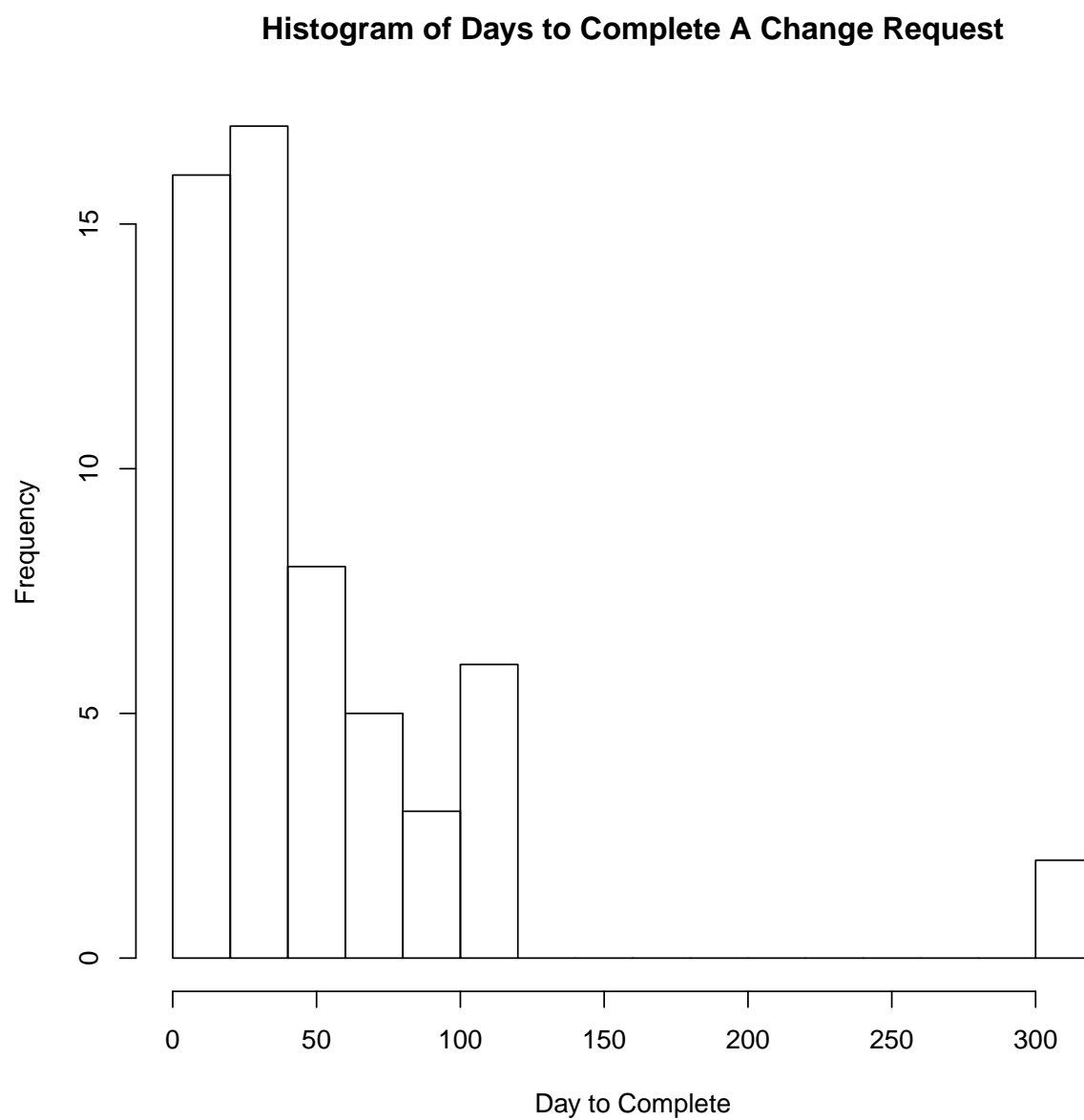
```
##
##      2   4   7   8  11  12  13  15  16  18  22  24  25  29  30  31  32  36
##      1   2   2   1   2   1   2   3   1   1   2   1   1   1   2   2   1   3
##     37  38  39  41  42  44  51  52  68  69  72  78  79  92  98 100 105 108
##      2   1   1   1   2   3   1   1   1   1   1   1   1   1   1   1   2   1
##    115 119 316 318
##      2   1   1   1
```

```
quantile(work.all$Interval)
```

```
##      0%  25%  50%  75% 100%
##      2   16   36   69  318
```

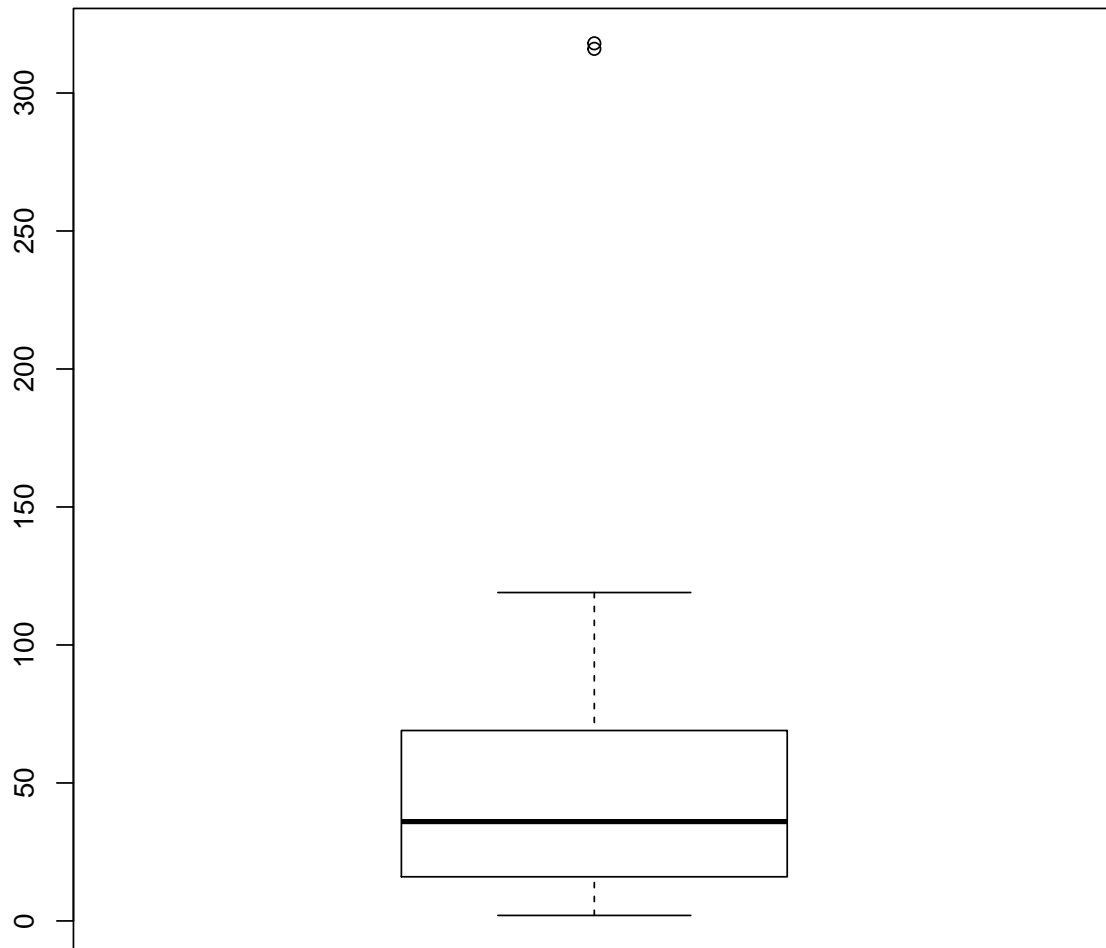
```
hist(work.all$Interval,
     breaks = 20,
```

```
main = "Histogram of Days to Complete A Change Request",  
xlab = "Day to Complete")
```



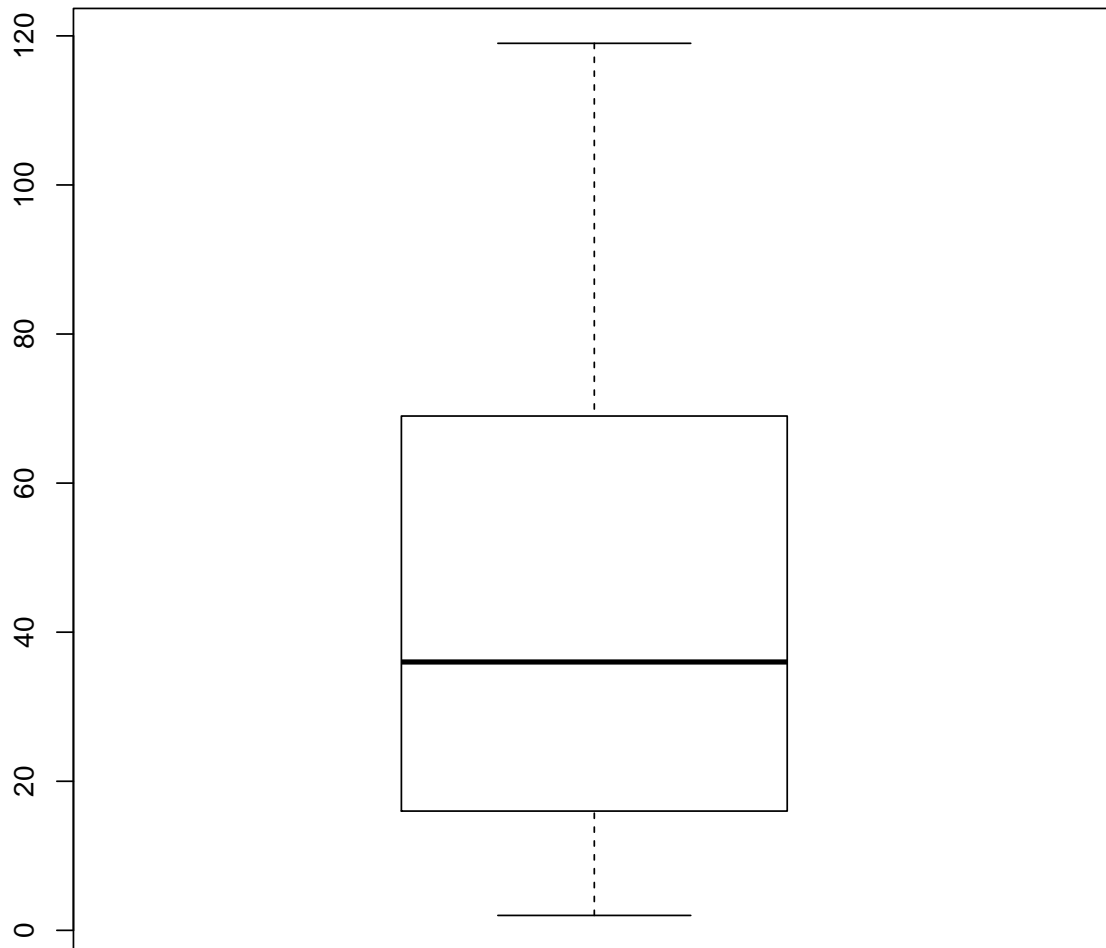
```
boxplot(work.all$Interval,  
main = "Box Plot of Days to Complete")
```


Box Plot of Days to Complete



```
boxplot(work.all$Interval,  
        main = "Box Plot of Days to Complete With Outliers Removed",  
        outline = FALSE)
```

Box Plot of Days to Complete With Outliers Removed



Number of Days That Currently Open CR Have Been Pending

```
# selected records that have approved CR but no IE
work.open <- subset(ACR,
                    subset = (CRApproved == "A-FP" | CRApproved == "A") &
                             is.na(IEApproved))

# compute days open
work.open$daysOpen <- as.numeric(as.Date("2-Jan-19", format = "%d-%b-%y") -
                                work.open$CRDate)

# Results
nrow(work.open)
```

```
## [1] 88
```

```
summary(work.open$daysOpen)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
## -86.00 -69.25  -49.00  -38.92  -18.00   90.00
```

```
sd(work.open$daysOpen)
```

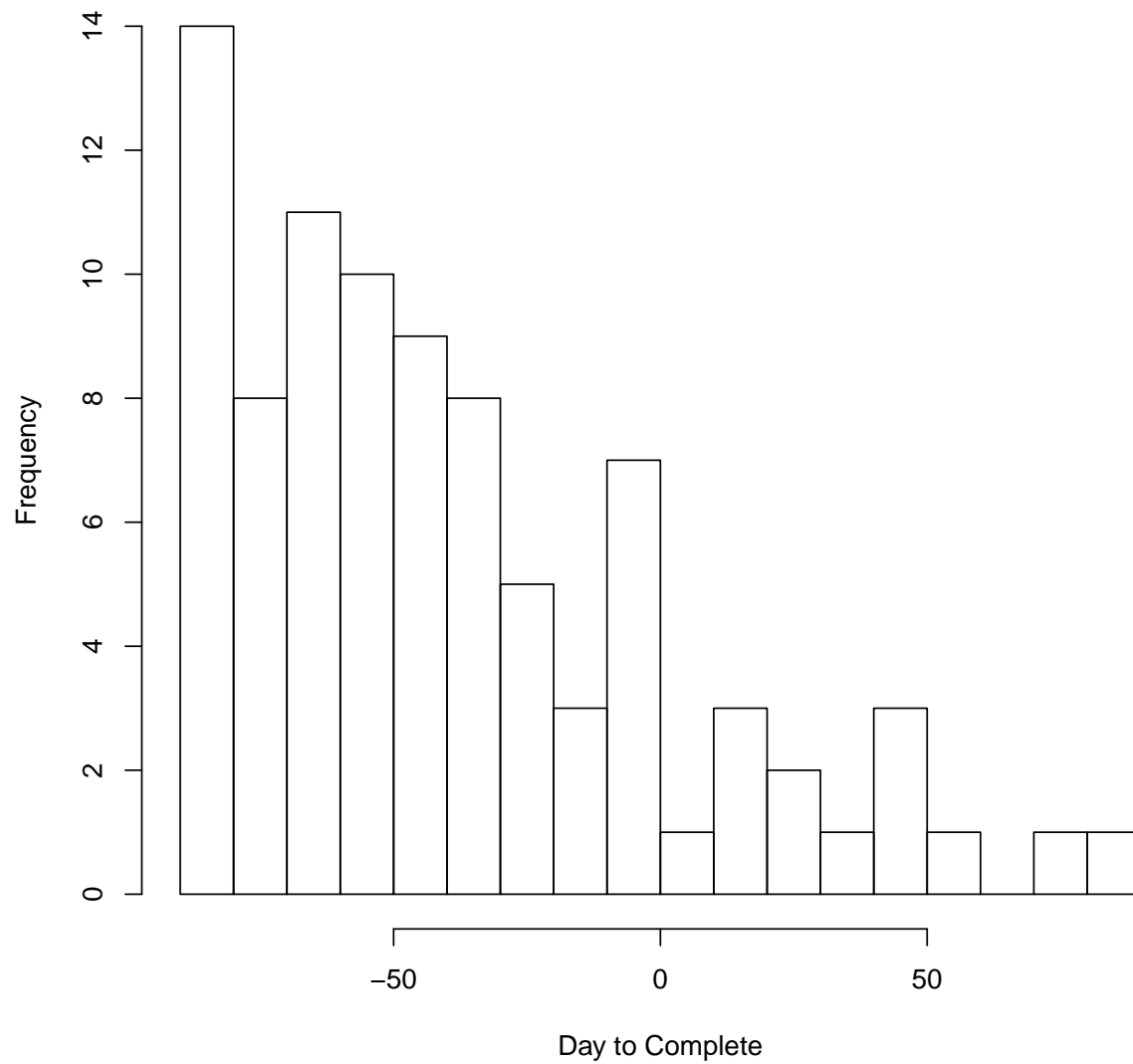
```
## [1] 40.66494
```

```
quantile(work.open$daysOpen)
```

```
##      0%      25%      50%      75%     100%
## -86.00 -69.25 -49.00 -18.00  90.00
```

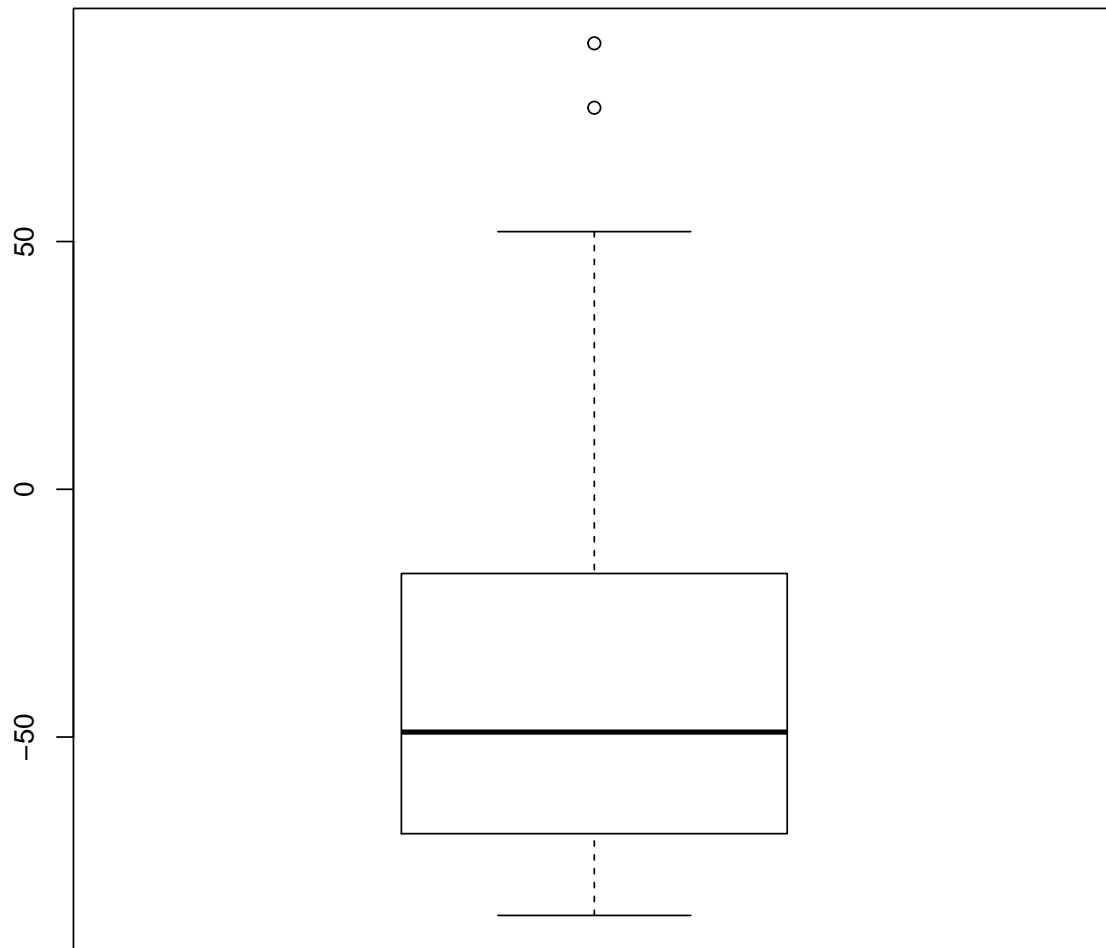
```
hist(work.open$daysOpen,
      breaks = 20,
      main = "Histogram of Days Request Open With No IE",
      xlab = "Day to Complete")
```

Histogram of Days Request Open With No IE



```
boxplot(work.open$daysOpen,  
        main = "Box Plot of Days Request Open With No IE")
```

Box Plot of Days Request Open With No IE



```
boxplot(work.open$daysOpen,  
        main = "Box Plot of Days Request Open With No IE With Outliers Removed",  
        outline = FALSE)
```

Box Plot of Days Request Open With No IE With Outliers Removed

