

Explore 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':   272 obs. of  14 variables:
##  $ SQA          : Factor w/  5 levels "Beilah","Liz",...: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Application: Factor w/ 18 levels "ADDCOM","AFMS",...: 15 17 17 15 18 3 3 11 11 12 ...
##  $ CRNumber    : chr  "18-33882" "18-34518" "18-36023" "18-38261" ...
##  $ CRDate      : Date, format: "2018-10-12" "2018-10-17" ...
##  $ CRApproved  : Factor w/  4 levels "", "A", "A-FP",...: 3 3 3 3 3 2 3 3 3 3 ...
##  $ IENumber    : chr  "18-33882" "" "19-1947" "" ...
##  $ IEDate      : Date, format: "2018-11-07" NA ...
##  $ IEApproved  : Factor w/  3 levels "A", "A-FP", "D": 2 NA 2 NA 2 NA NA 2 NA NA ...
##  $ Reason      : Factor w/  6 levels "Inaccurate information",...: NA NA NA NA NA NA NA NA NA ...
##  $ Comments    : chr  "" "" "" "" ...
##  $ CRmonth     : Ord.factor w/ 12 levels "Jan"<"Feb"<"Mar"<...: 10 10 10 11 11 12 12 12 1 1 ...

```

```
## $ CYear      : num  2018 2018 2018 2018 2018 ...
## $ IEmonth     : Ord.factor w/ 12 levels "Jan"<"Feb"<"Mar"<...: 11 NA 1 NA 11 NA NA 12 NA NA ...
## $ IYear       : num  2018 NA 2019 NA 2018 ...
```

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

Counts

Data Changes (CR) Request Approved

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

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

Data Change Request Disapproved

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

```
## [1] 6
```

Implementation and Effectivity (IE) Approved

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

```
## [1] 46
```

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] 79.6875
```

IE

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

```
## [1] 90
```

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] 49.46237
```

Number by Application

Opened

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

```
##
##                ADDCOM
##                  1
##                AFMS
##                  1
##                ALMS
##                 14
##                APLM
##                  3
##                CMSNext
##                 25
##                DaVinci
##                  0
## E-labeling Web Package Insert Retrieval
##                  0
##                eNovator
##                  2
##                GDSN/GS1
##                  3
##                  iQ
##                  5
```

```
## Metrics Library
## 1
## MSS
## 2
## NPV
## 0
## PCN/SCN
## 0
## PEAR
## 0
## QPI
## 0
## RSLMS
## 1
## WVLIMS
## 0
```

Completed

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

```
##
## ADDCOM
## 1
## AFMS
## 1
## ALMS
## 9
## APLM
## 0
## CMSNext
## 16
## DaVinci
## 0
## E-labeling Web Package Insert Retrieval
## 2
## eNovator
## 7
## GDSN/GS1
## 4
## iQ
## 2
## Metrics Library
## 1
## MSS
## 1
## NPV
## 0
## PCN/SCN
## 0
## PEAR
## 0
## QPI
```

Total

##	
##	ADDCOM
##	2
##	AFMS
##	2
##	ALMS
##	23
##	APLM
##	3
##	CMSNext
##	41
##	DaVinci
##	0
##	E-labeling Web Package Insert Retrieval
##	2
##	eNovator
##	9
##	GDSN/GS1
##	7
##	iQ
##	7
##	Metrics Library
##	2
##	MSS
##	3
##	NPV
##	0
##	PCN/SCN
##	0
##	PEAR
##	0
##	QPI
##	0
##	RSLMS
##	3
##	WWLIMS
##	0

This is the interval between CR approval and IE approval

```

# select records that have been approved (both CR and 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 == "Jan" & IEyear == 2019))
# compute interval
work.all$Interval <- as.numeric(work.all$IEDate - work.all$CRDate)
# results
nrow(work.all)

```

```
## [1] 46
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      -2.00   8.00   21.00   68.30   77.75   548.00
```

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

```
## [1] 125.1079
```

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

```
##
##  -2   1   2   5   6   8   9  11  12  13  16  17  19  20  22  23  26  28
##   1   3   1   1   3   4   2   1   1   2   1   1   1   1   1   2   1   2
##  29  51  74  79  82  91 104 110 121 294 406 518 548
##   2   2   1   1   1   1   3   1   1   1   1   1   1
```

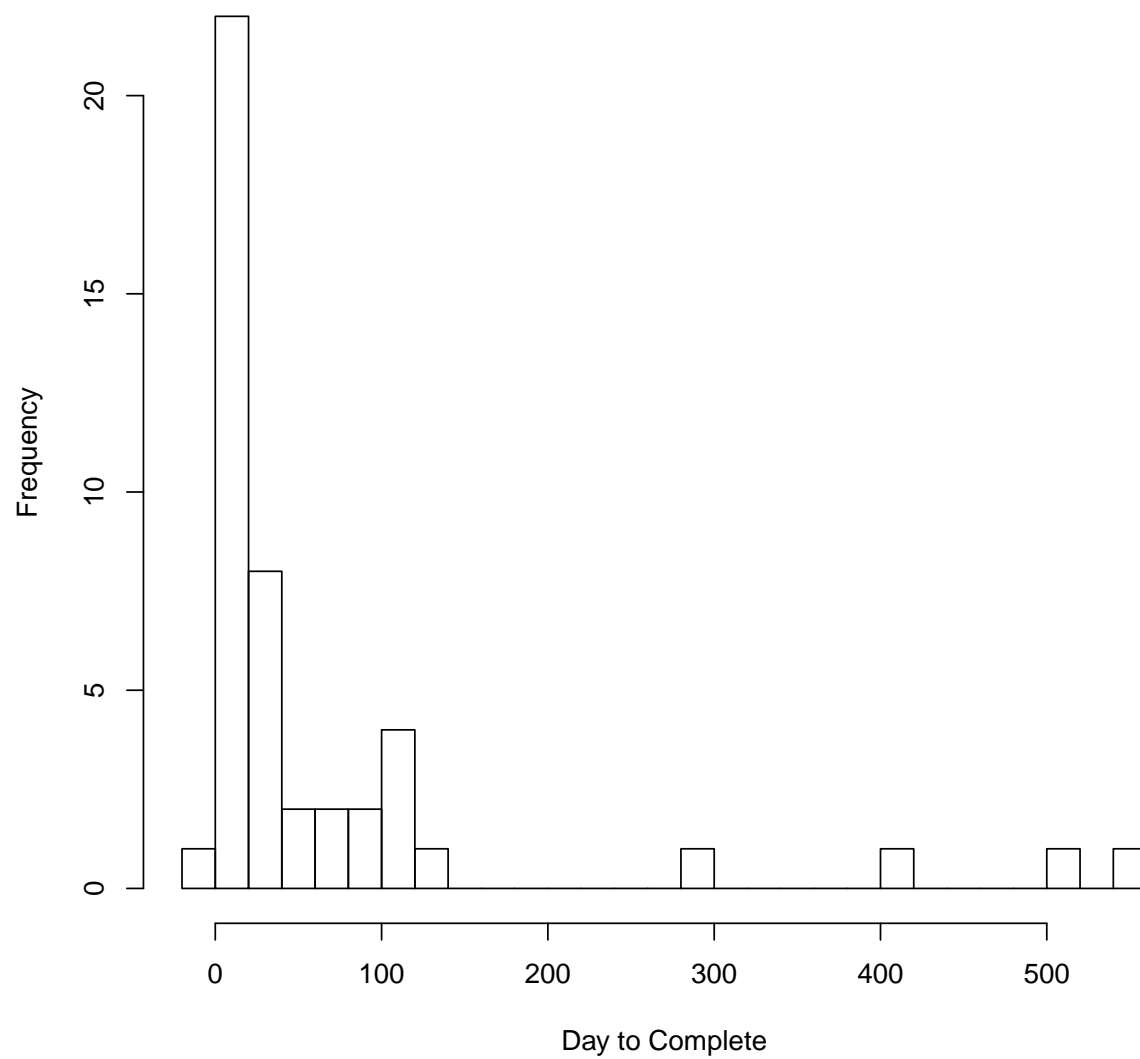
```
quantile(work.all$Interval)
```

```
##      0%      25%      50%      75%     100%
##  -2.00    8.00   21.00   77.75  548.00
```

```
hist(work.all$Interval,
  breaks = 20,
  main = "Histogram of Days to Complete A Change Request",
  xlab = "Day to Complete")

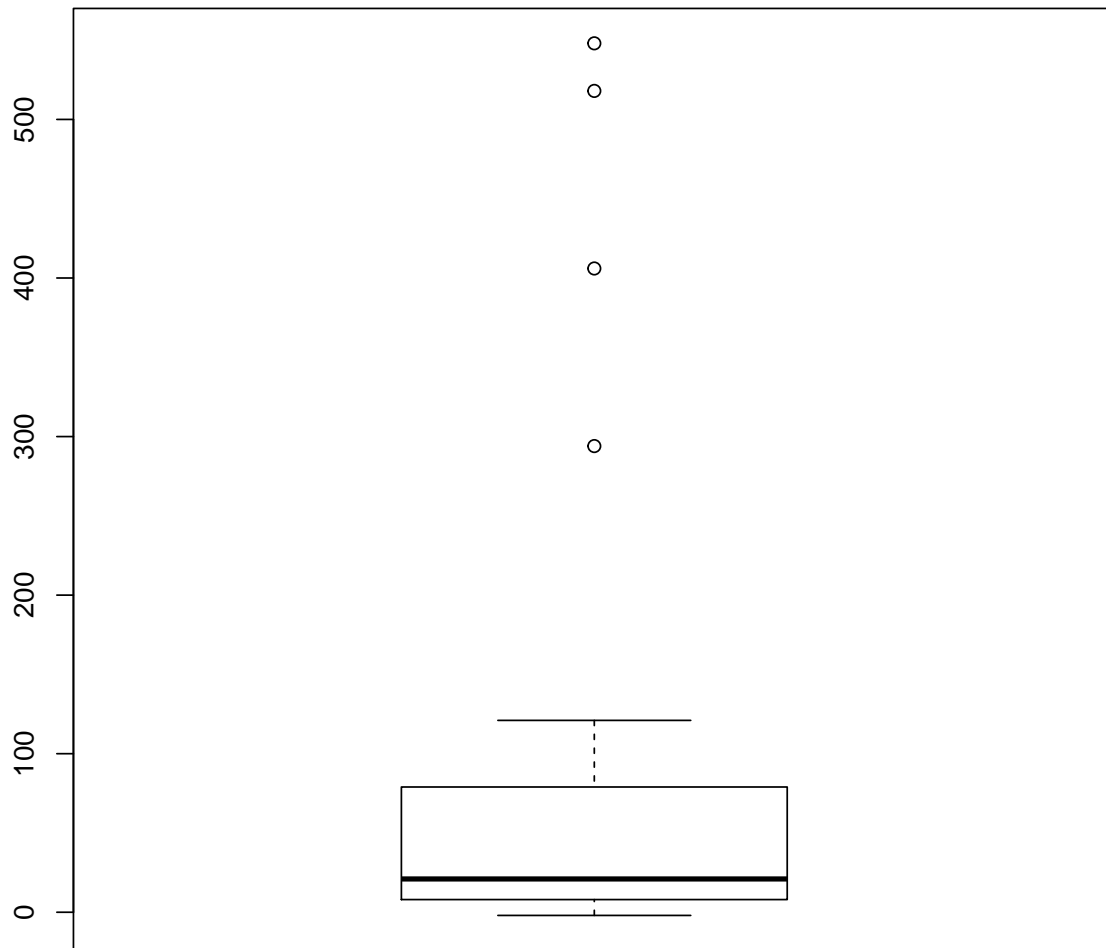
```

Histogram of Days to Complete A Change Request



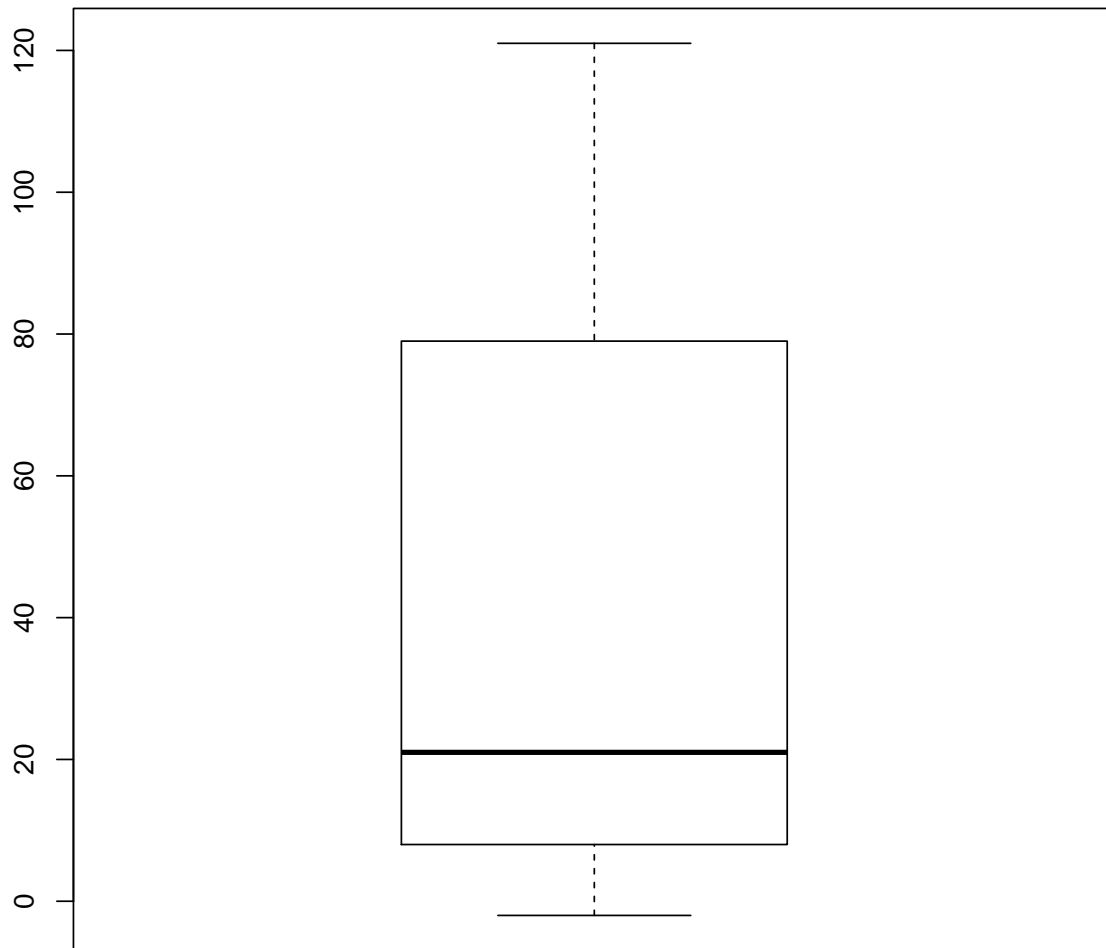
```
boxplot(work.all$Interval,  
        main = "Box Plot of Days to Complete")
```


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] 62
```

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

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -30.00 -15.00   0.00   13.13  36.00   93.00
```

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

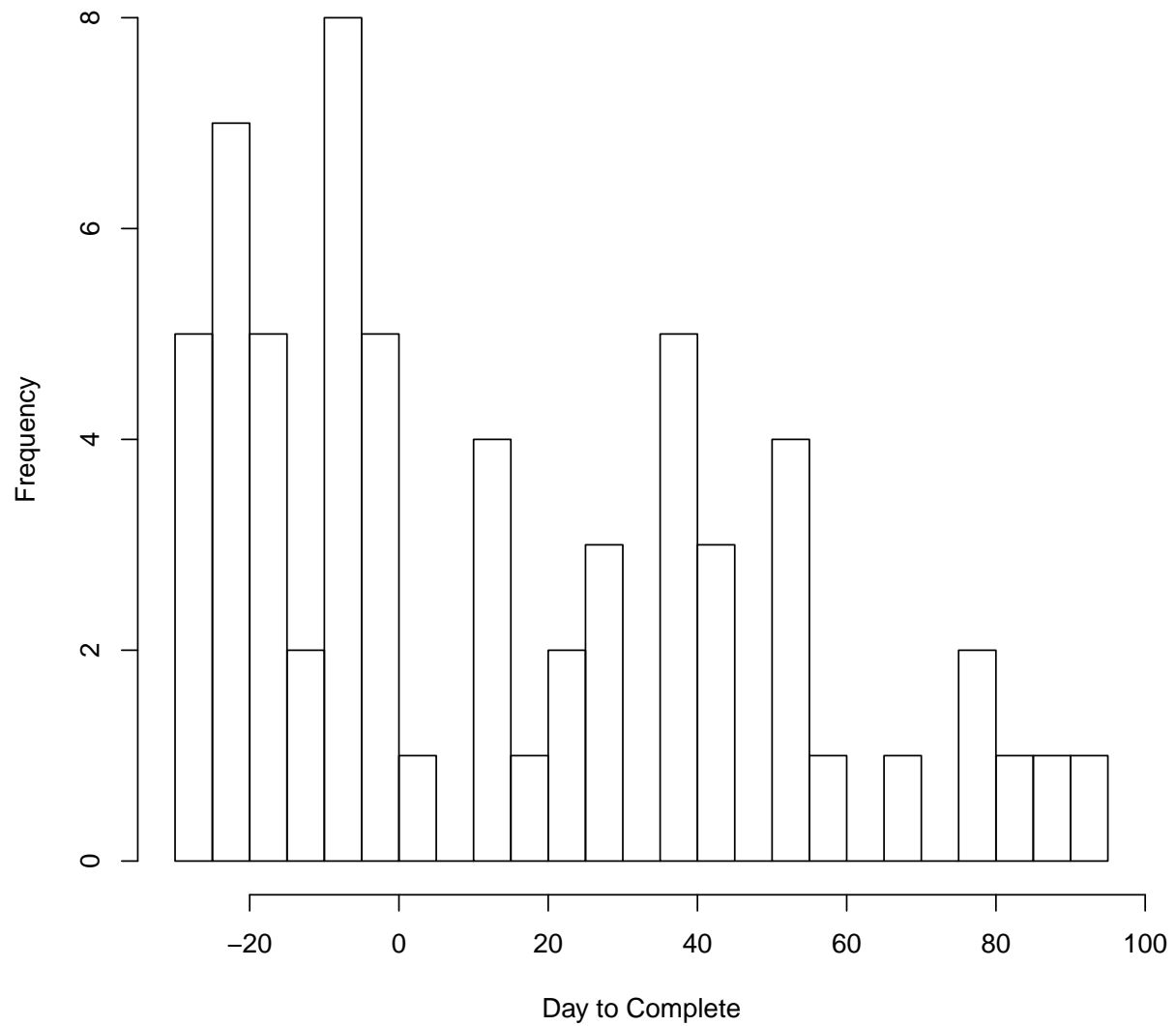
```
## [1] 33.92977
```

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

```
##      0%  25%  50%  75% 100%
## -30 -15   0   36   93
```

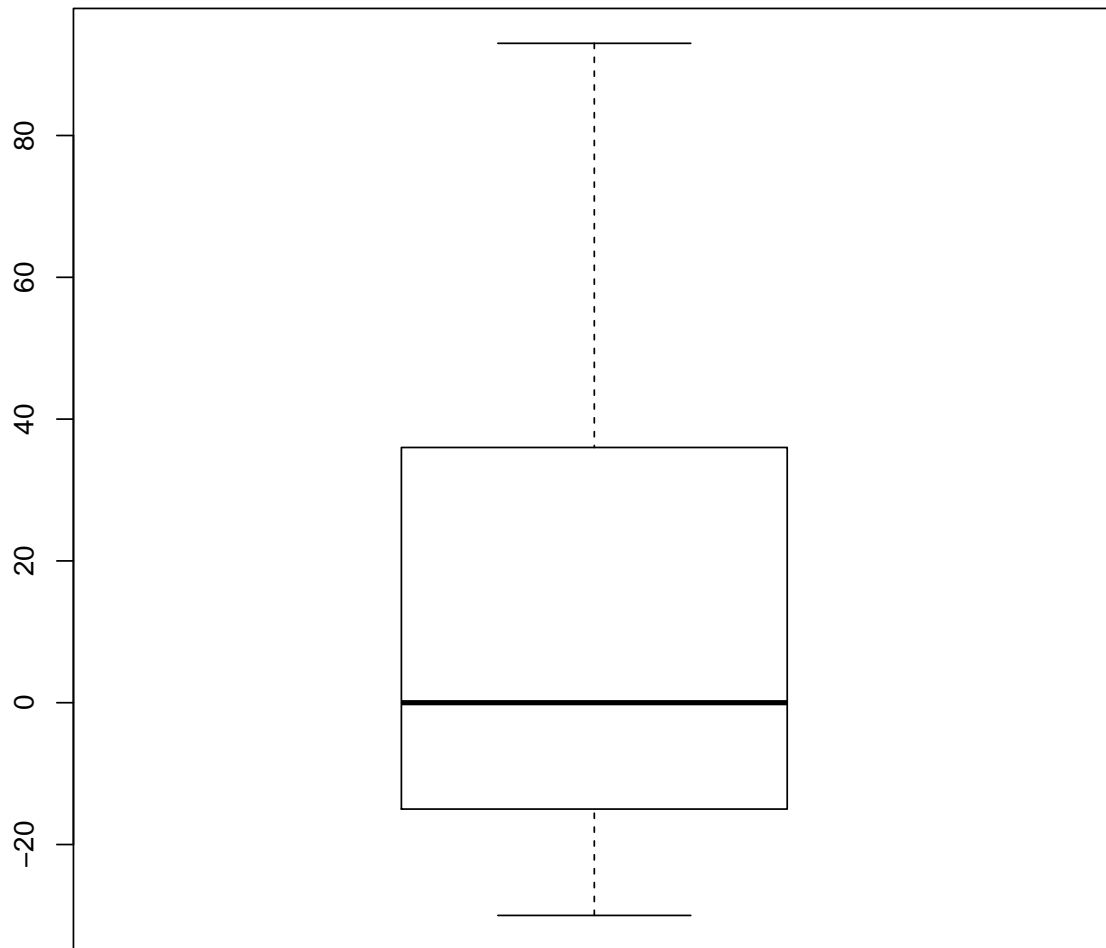
```
hist(work.open$daysOpen,
      breaks = 20,
      main = "Histogram of Days Request Open With No IE",
      xlab = "Day to Complete")
```

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

