Sharat_Sripada_HW4.R

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```r
#
#      Course: IST-687
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#      Homework #4
#      Due Date: 2/9/2020
#      Date Submitted: 2/9/2020
#      Topic: Samples HW

# Install moments package for skewness calculation
# install.packages("moments")

# Step1-1: Summarizing function to understand distribution of a vector
# Step1-2: Calculate mean, min, max, sd, quantile & skewness
printVecInfo <- function(input){
  my_mean <- mean(input)
  my_median <- median(input)
  my_min <- min(input)
  my_max <- max(input)
  my_sd <- sd(input)
  my_quantile <- quantile(input, probs=c(0.05, 0.95))
  library("moments")
  my_skewness <- skewness(input)
  cat("Mean:", my_mean, "Median:", my_median, "Min:", my_min,
      "Max:", my_max, "Std.Dev:", my_sd,
      "Quantile (0.05-0.95):", my_quantile,
      "Skewness:", my_skewness)
}

# Step1-3:
# Create a vector with c(1,2,3,4,5,6,7,8,9,10,50) & call
# function printVecInfo
myData <- c(1,2,3,4,5,6,7,8,9,10,50)
printVecInfo(myData)
```
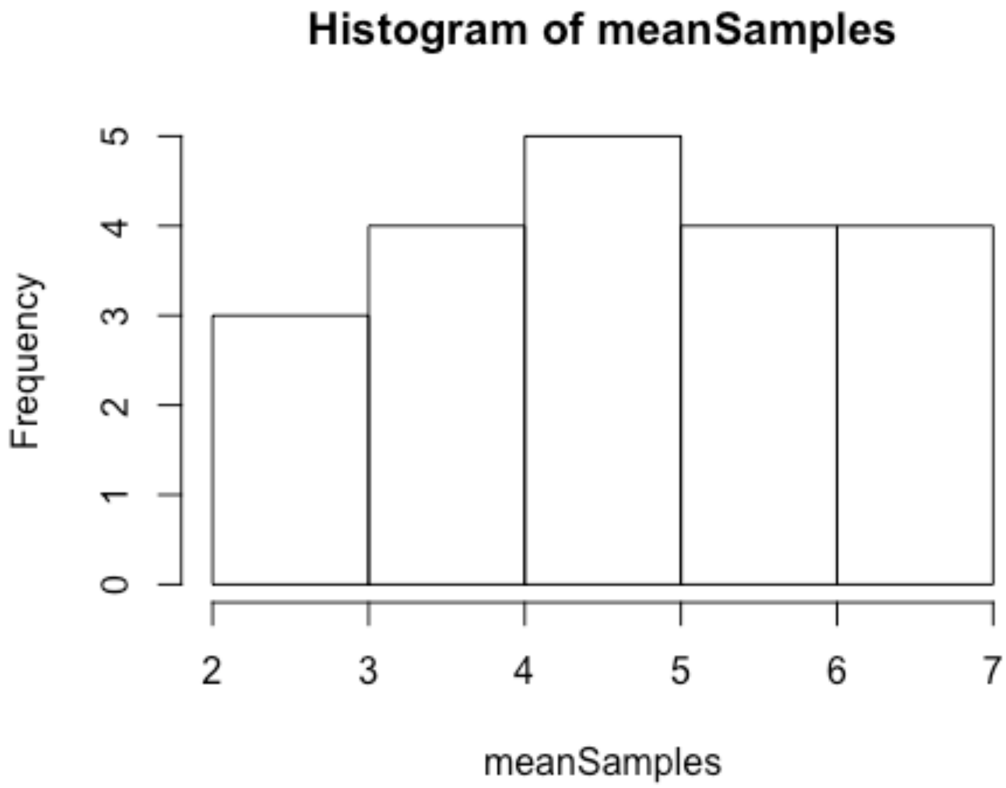

```
## Mean: 9.545455 Median: 6 Min: 1 Max: 50 Std.Dev: 13.72125 Quantile (0.05-
0.95): 1.5 30 Skewness: 2.620396
```

```r
# Step2-4:
# Create a jar var with 50x red & 50x blue marbles/strings
red <- replicate(50, 'red')
blue <- replicate(50, 'blue')
jar <- c(red, blue)
```

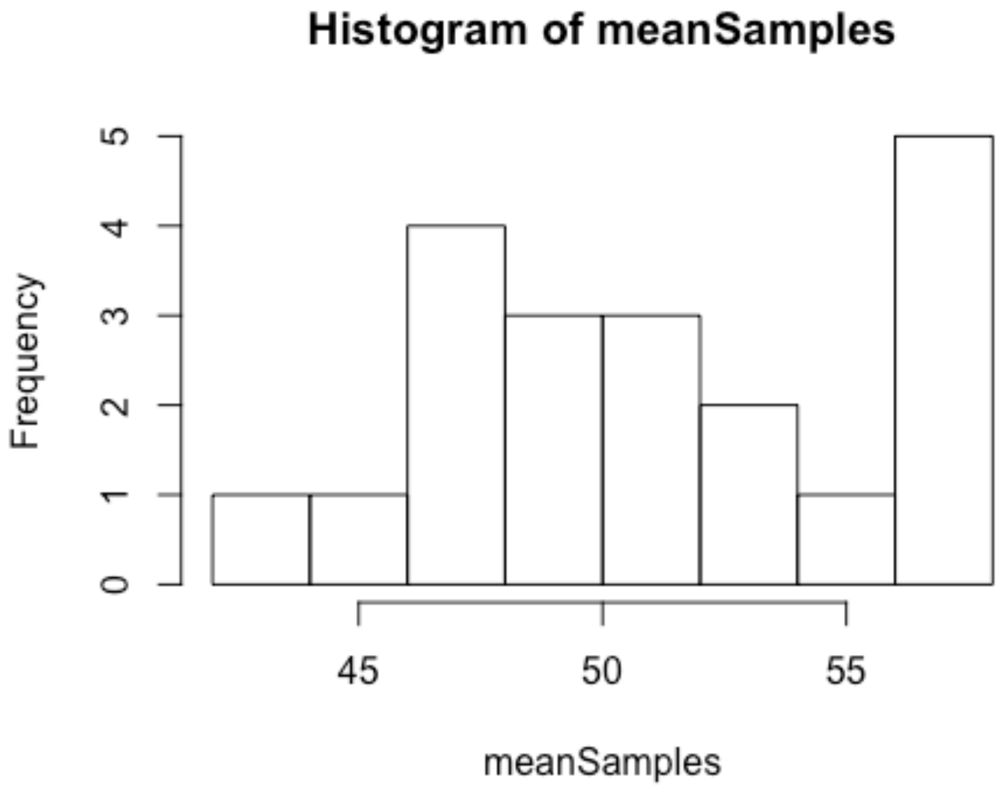
```
# Step2-5:
# Count if there are 50 red marbles in the jar
count_red <- length(jar[jar == 'red'])
if (count_red == 50) "There are 50 red marbles in the jar!"

## [1] "There are 50 red marbles in the jar!"

# Step2-6:
# Sample 10 marbles from the jar & count % of red marbles
sampleSize <- 10
sampleSet <- sample(jar, sampleSize, replace = TRUE)
sampleSet

##  [1] "red"  "blue" "red"  "red"  "red"  "red"  "blue" "blue" "red"  "red"

count_red_sample <- length(sampleSet[sampleSet == 'red'])
count_red_sample

## [1] 7

percent_red <- count_red_sample/sampleSize * 100
percent_red

## [1] 70

# Step2-7:
# Sample the jar 20x times using the replicate() function
# with sampleSize <- 10, each time counting red marbles in the sample.
# Method to count red marbles in jar:
# - grep for "red" - grep("red", sample(jar, sameplSize, replace=TRUE))
# - count using length
meanSamples <- replicate(20, mean(length(grep("red", sample(jar, sampleSize,
replace = TRUE))),
                                  simplify = TRUE))
printVecInfo(meanSamples)

## Mean: 5.05 Median: 5 Min: 2 Max: 7 Std.Dev: 1.468081 Quantile (0.05-0.95):
2.95 7 Skewness: -0.2925982

hist(meanSamples)
```



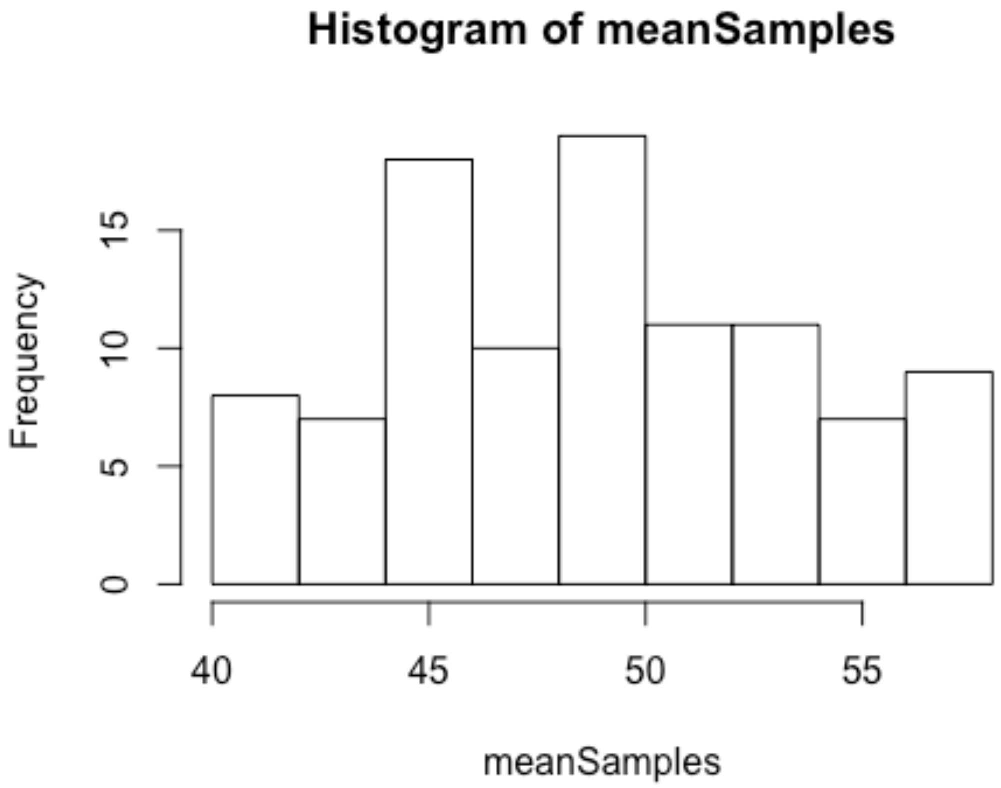
```
# Step2-8:
# Repeat with replicate with a larger sampleSize (sample = 100)
sampleSize <- 100
meanSamples <- replicate(20, mean(length(grep("red", sample(jar, sampleSize,
replace = TRUE))),
                                  simplify = TRUE))
printVecInfo(meanSamples)
```

```
## Mean: 51.75 Median: 51.5 Min: 43 Max: 58 Std.Dev: 4.482422 Quantile (0.05-
0.95): 44.9 58 Skewness: -0.0613819
```

```
hist(meanSamples)
```

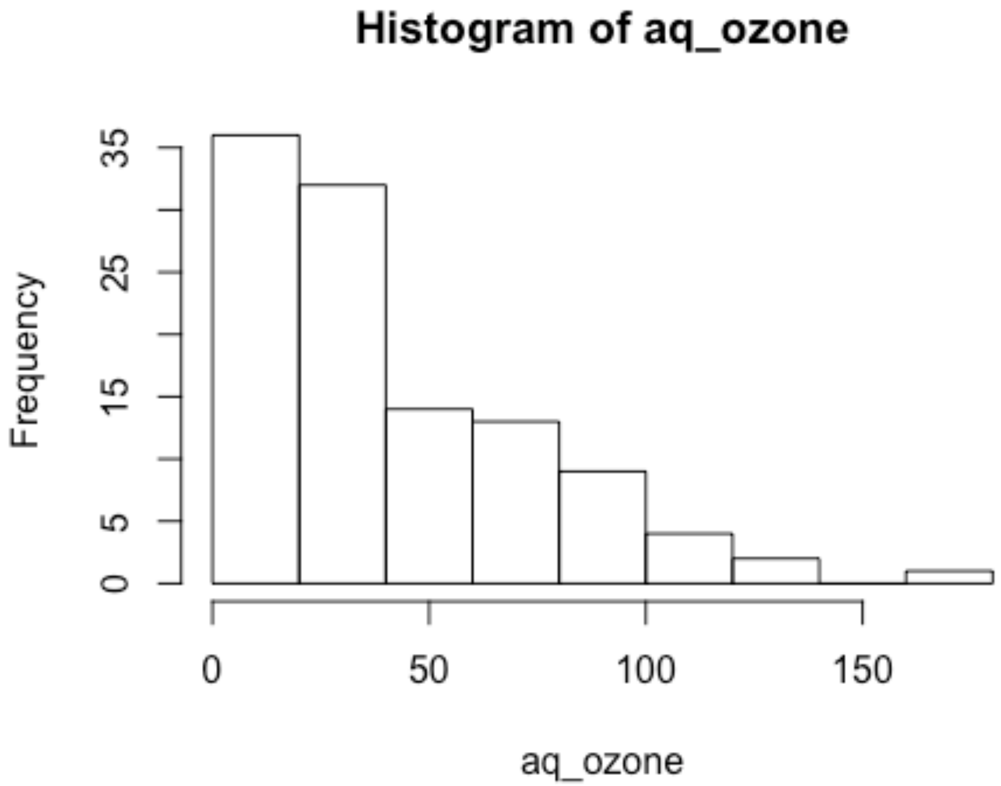


```
# Step2-9:
# Repeat with larger replication size (replicate 100x times)
meanSamples <- replicate(100, mean(length(grep("red", sample(jar, sampleSize,
replace = TRUE))),
                                  simplify = TRUE))
printVecInfo(meanSamples)

## Mean: 49.26 Median: 49 Min: 40 Max: 58 Std.Dev: 4.600439 Quantile (0.05-
0.95): 42 57 Skewness: 0.09988368

hist(meanSamples)
```



```
# Step3-10:
# Store airquality data-set into a temp. var
data()
aq <- airquality

# Step3-11:
# Clean the data-set (remove NAs)
summary(aq)
```

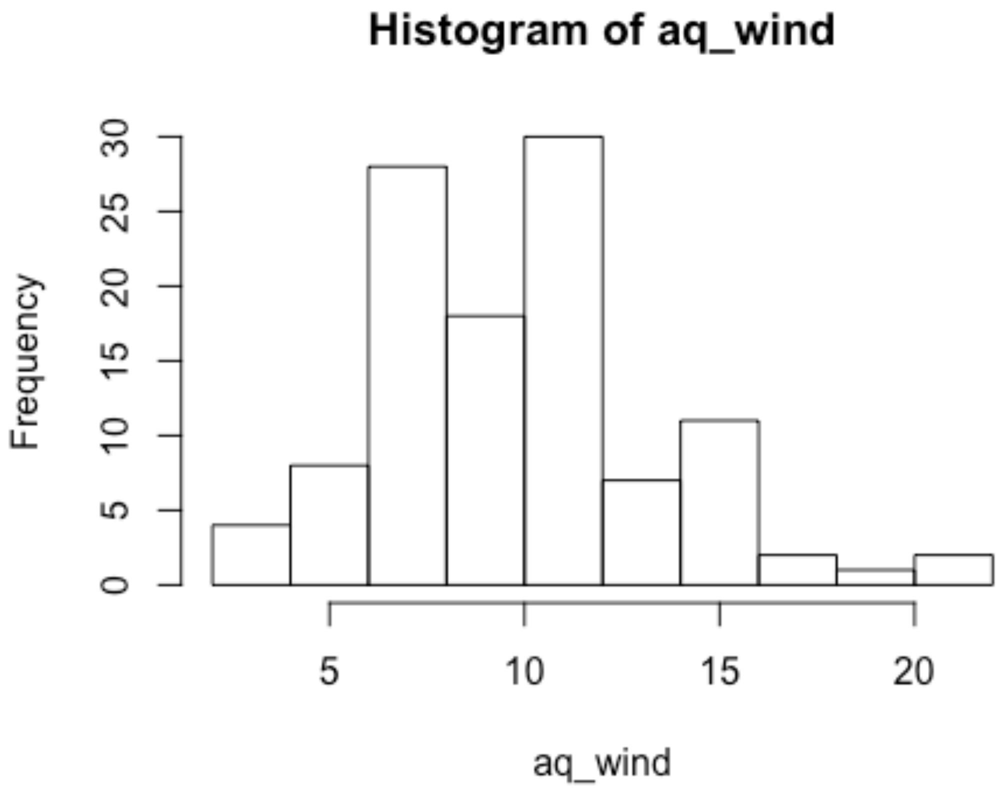
```
##      Ozone           Solar.R           Wind             Temp      
##  Min.   :  1.00   Min.   :  7.0   Min.   : 1.700   Min.   :56.00  
##  1st Qu.: 18.00   1st Qu.:115.8   1st Qu.: 7.400   1st Qu.:72.00  
##  Median : 31.50   Median :205.0   Median : 9.700   Median :79.00  
##  Mean   : 42.13   Mean   :185.9   Mean   : 9.958   Mean   :77.88  
##  3rd Qu.: 63.25   3rd Qu.:258.8   3rd Qu.:11.500   3rd Qu.:85.00  
##  Max.   :168.00   Max.   :334.0   Max.   :20.700   Max.   :97.00  
##  NA's   :37       NA's   :7                                       
##      Month            Day      
##  Min.   :5.000   Min.   : 1.0  
##  1st Qu.:6.000   1st Qu.: 8.0  
##  Median :7.000   Median :16.0  
##  Mean   :6.993   Mean   :15.8  
##  3rd Qu.:8.000   3rd Qu.:23.0  
##  Max.   :9.000   Max.   :31.0
##

dim(aq)

## [1] 153   6

# Omit NAs from the data-set
# NOTE - This will remove the row in full!
aq_omit_na <- na.omit(aq)
dim(aq_omit_na)

## [1] 111   6

# Step3-12:
# Explore Ozone data by calling printVecInfo & hist()
aq_ozone <- aq_omit_na$Ozone
printVecInfo(aq_ozone)

## Mean: 42.0991 Median: 31 Min: 1 Max: 168 Std.Dev: 33.27597 Quantile (0.05-
0.95): 8.5 109 Skewness: 1.248104

hist(aq_ozone)
```



```r
# Explore Wind data by calling printVecInfo & hist()
aq_wind <- aq_omit_na$Wind
printVecInfo(aq_wind)
```

```
## Mean: 9.93964 Median: 9.7 Min: 2.3 Max: 20.7 Std.Dev: 3.557713 Quantile
(0.05-0.95): 4.6 15.5 Skewness: 0.4556414
```

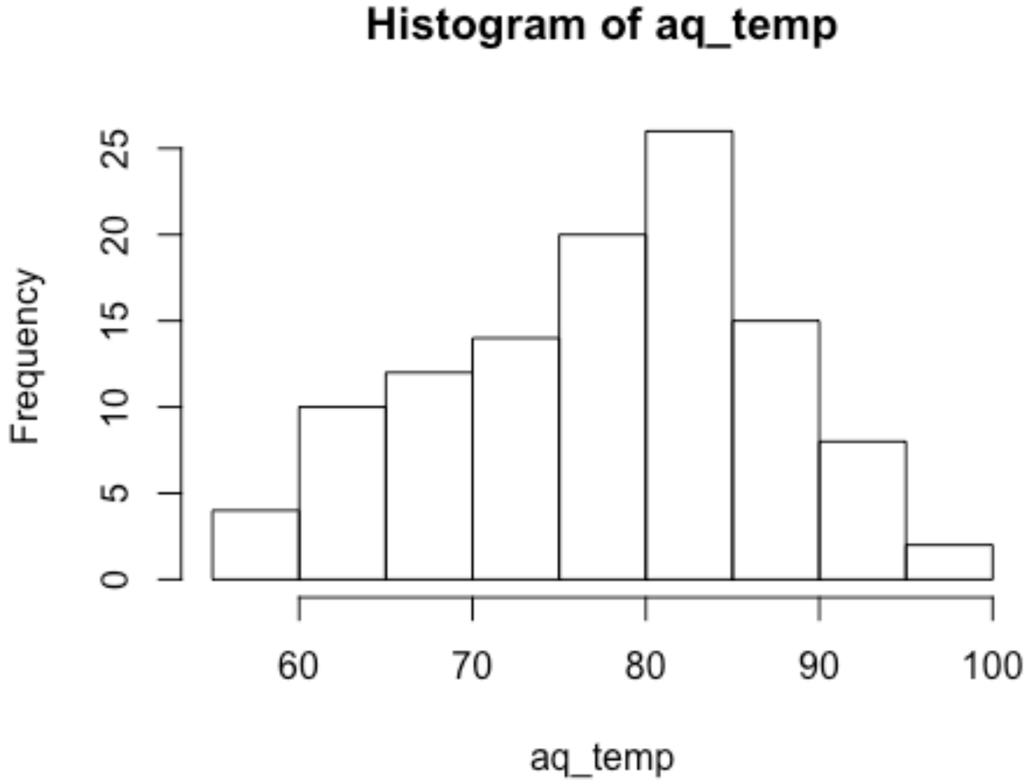
```r
hist(aq_wind)
```



```r
# Explore Temp data by calling printVecInfo & hist()
aq_temp <- aq_omit_na$Temp
printVecInfo(aq_temp)
```

```
## Mean: 77.79279 Median: 79 Min: 57 Max: 97 Std.Dev: 9.529969 Quantile
(0.05-0.95): 61 92.5 Skewness: -0.2250959
```

```r
hist(aq_temp)
```



Histogram of aq_temp