Assignment 8.1

Abhishek Murthy

2024-09-29

```
library(psych)
```

```
## Warning: package 'psych' was built under R version 4.3.3
```

```
library(moments)
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.3.3
```

```
##
## Attaching package: 'ggplot2'
```

```
## The following objects are masked from 'package:psych':
##
##     %+%, alpha
```

```
data(mtcars)
head(mtcars)
```

```
##                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

```
mean_mpg <- mean(mtcars$mpg)
mean_mpg
```

```
## [1] 20.09062
```

```
geo_mean_mpg <- geometric.mean(mtcars$mpg)
geo_mean_mpg
```

```
## [1] 19.25006
```

```
harm_mean_mpg <- harmonic.mean(mtcars$mpg)
harm_mean_mpg
```

```
## [1] 18.44092
```

```r
median_mpg <- median(mtcars$mpg)
median_mpg
```

```
## [1] 19.2
```

```r
quantiles_mpg <- quantile(mtcars$mpg, probs = c(0.25, 0.5, 0.75))
quantiles_mpg
```

```
##    25%    50%    75%
## 15.425 19.200 22.800
```

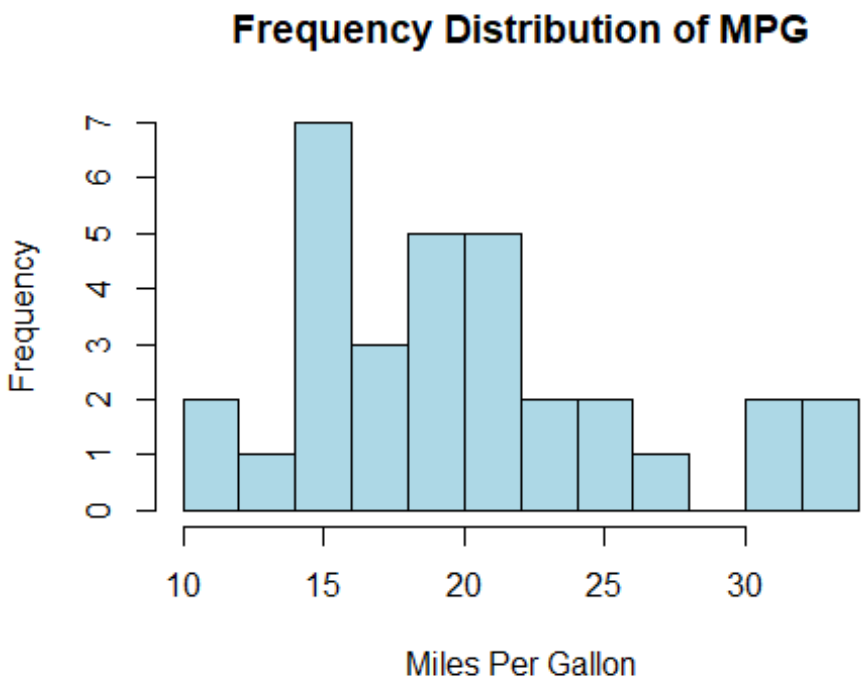
```r
ntile_mpg <- quantile(mtcars$mpg, probs = seq(0.1, 1, by = 0.1))
ntile_mpg
```

```
##   10%   20%   30%   40%   50%   60%   70%   80%   90%  100%
## 14.34 15.20 15.98 17.92 19.20 21.00 21.47 24.08 30.09 33.90
```

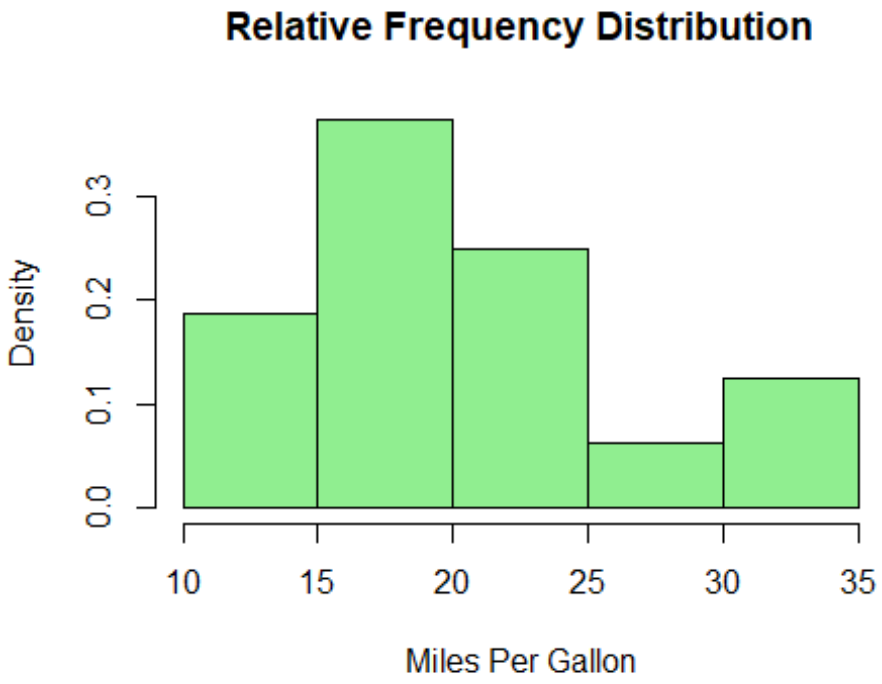
```r
percentiles_mpg <- quantile(mtcars$mpg, probs = seq(0.01, 1, by = 0.01))
percentiles_mpg
```

```
##     1%     2%     3%     4%     5%     6%     7%     8%     9%    10%
11%
## 10.400 10.400 10.400 11.096 11.995 12.894 13.470 13.780 14.090 14.340
14.464
##    12%    13%    14%    15%    16%    17%    18%    19%    20%    21%
22%
## 14.588 14.709 14.802 14.895 14.988 15.054 15.116 15.178 15.200 15.200
15.200
##    23%    24%    25%    26%    27%    28%    29%    30%    31%    32%
33%
## 15.239 15.332 15.425 15.518 15.611 15.704 15.797 15.980 16.166 16.352
16.607
##    34%    35%    36%    37%    38%    39%    40%    41%    42%    43%
44%
## 16.886 17.165 17.380 17.535 17.690 17.827 17.920 18.013 18.112 18.298
18.484
##    45%    46%    47%    48%    49%    50%    51%    52%    53%    54%
55%
## 18.670 18.830 18.985 19.140 19.200 19.200 19.200 19.260 19.415 19.570
19.765
##    56%    57%    58%    59%    60%    61%    62%    63%    64%    65%
66%
## 20.168 20.571 20.974 21.000 21.000 21.000 21.088 21.212 21.336 21.400
21.400
##    67%    68%    69%    70%    71%    72%    73%    74%    75%    76%
77%
## 21.400 21.408 21.439 21.470 21.513 21.916 22.319 22.722 22.800 22.800
22.800
##    78%    79%    80%    81%    82%    83%    84%    85%    86%    87%
88%
## 23.088 23.584 24.080 24.576 25.072 25.568 26.052 26.455 26.858 27.261
```

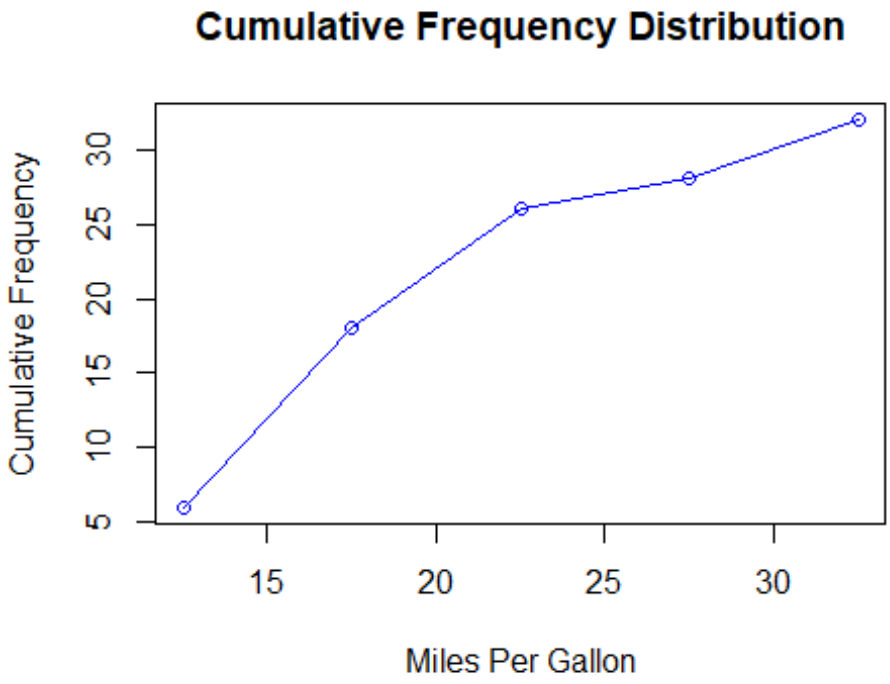
```
28.168
##    89%    90%    91%    92%    93%    94%    95%    96%    97%    98%
99%
## 29.129 30.090 30.400 30.400 30.400 30.680 31.300 31.920 32.505 32.970
33.435
##   100%
## 33.900

range_mpg <- range(mtcars$mpg)
range_mpg

## [1] 10.4 33.9

iqr_mpg <- IQR(mtcars$mpg)
iqr_mpg

## [1] 7.375

interdecile_range <- diff(quantile(mtcars$mpg, probs = c(0.1, 0.9)))
interdecile_range

##   90%
## 15.75

sd_mpg <- sd(mtcars$mpg)
sd_mpg

## [1] 6.026948

mad_mpg <- mad(mtcars$mpg)
mad_mpg

## [1] 5.41149

skewness_mpg <- skewness(mtcars$mpg)
skewness_mpg

## [1] 0.6404399

kurtosis_mpg <- kurtosis(mtcars$mpg)
kurtosis_mpg

## [1] 2.799467

hist(mtcars$mpg, breaks = 10, main = "Frequency Distribution of MPG", xlab =
"Miles Per Gallon", col = "lightblue")
```



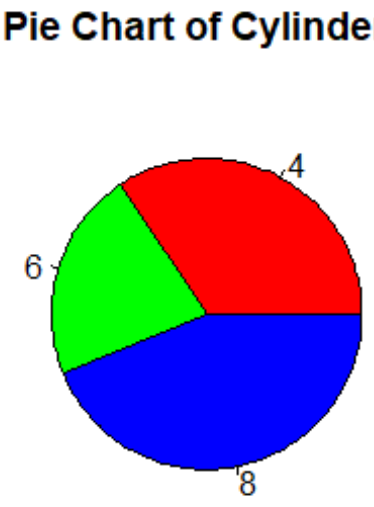

```r
relative_freq <- hist(mtcars$mpg, plot = FALSE)
relative_freq$density <- relative_freq$counts / sum(relative_freq$counts)
plot(relative_freq, freq = FALSE, main = "Relative Frequency Distribution",
xlab = "Miles Per Gallon", col = "lightgreen")
```




```r
cum_freq <- cumsum(relative_freq$counts)
plot(relative_freq$mids, cum_freq, type = "o", col = "blue", main =
"Cumulative Frequency Distribution", xlab = "Miles Per Gallon", ylab =
"Cumulative Frequency")
```




```r
cyl_counts <- table(mtcars$cyl)
pie(cyl_counts, main = "Pie Chart of Cylinders", col =
rainbow(length(cyl_counts)))
```



```r
ggplot(mtcars, aes(x = factor(gear), fill = factor(cyl))) +
  geom_bar(position = "stack") +
  labs(x = "Gear", y = "Count", fill = "Cylinders") +
  ggtitle("Stacked Bar Plot of Gear and Cylinders")
```