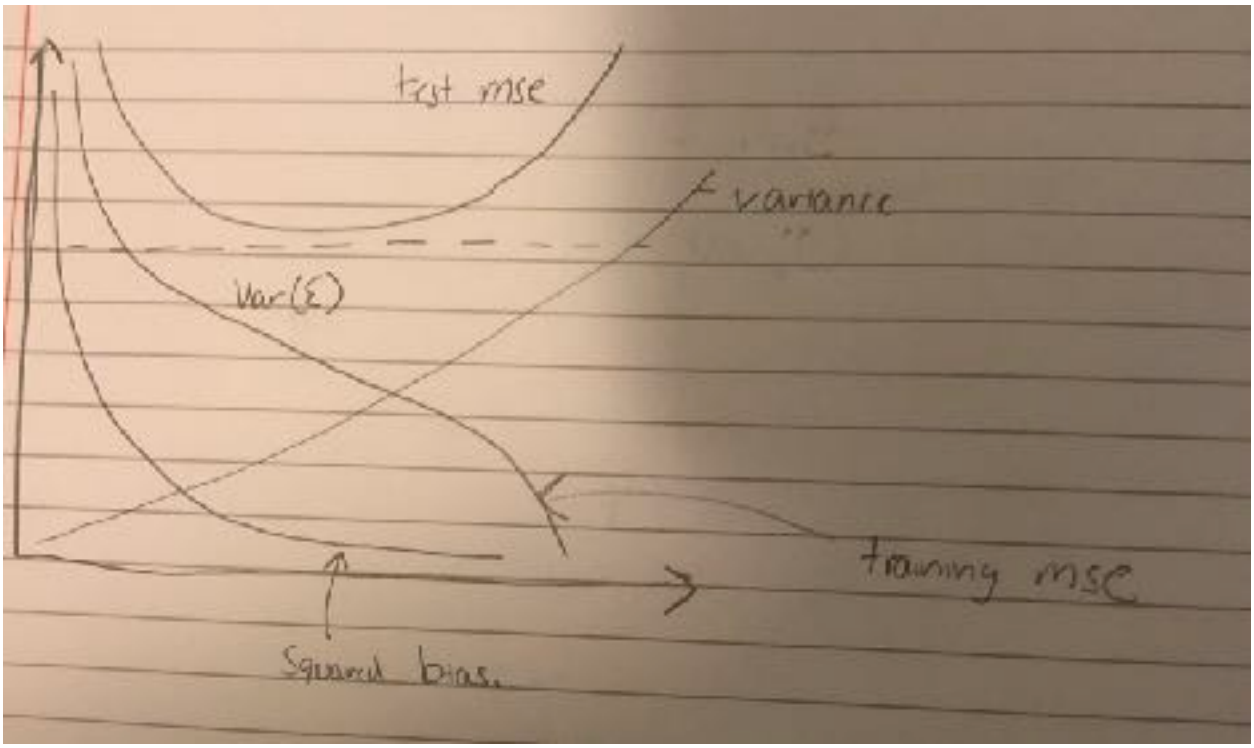
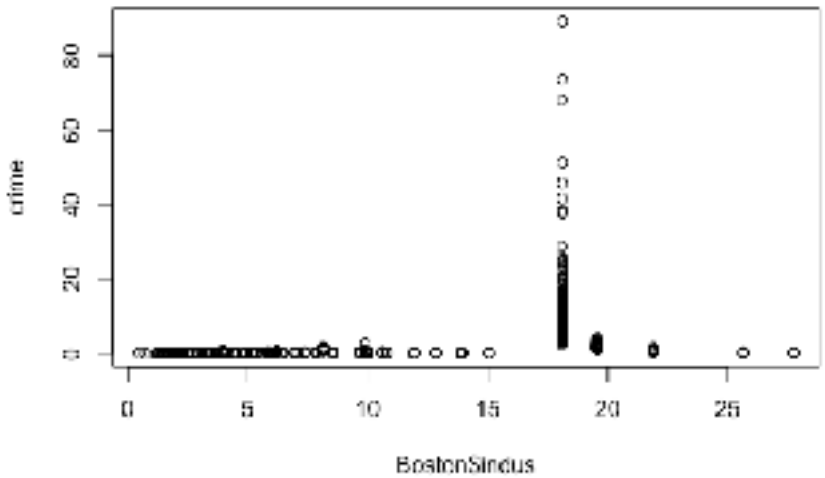
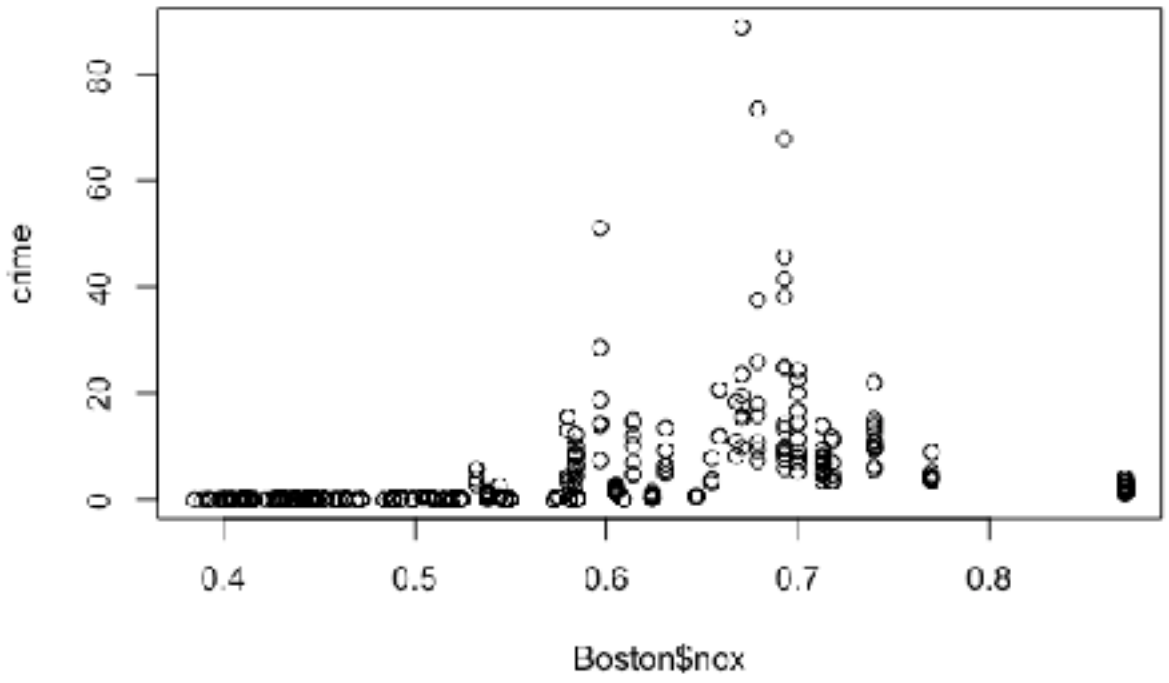
Karl Hickel
Problem set 2
Written answers and output

Chapter 2
Question 3 Graph



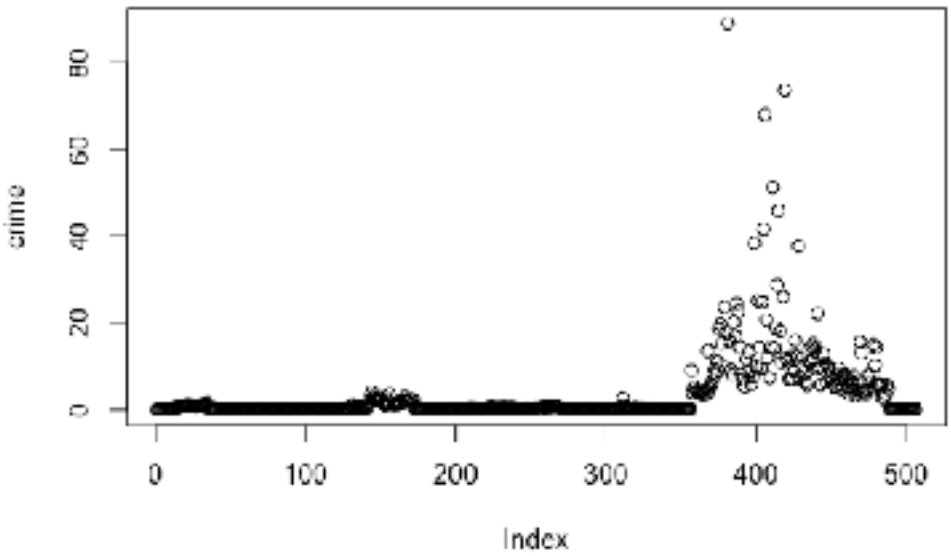
Question 10 Graphs

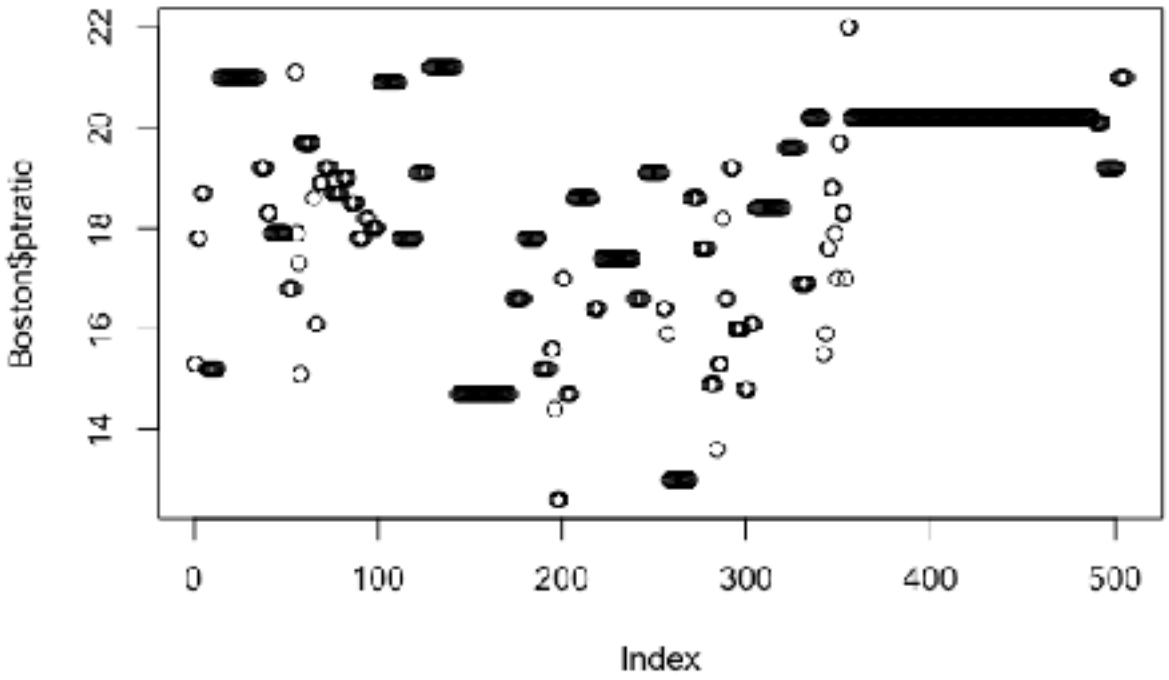




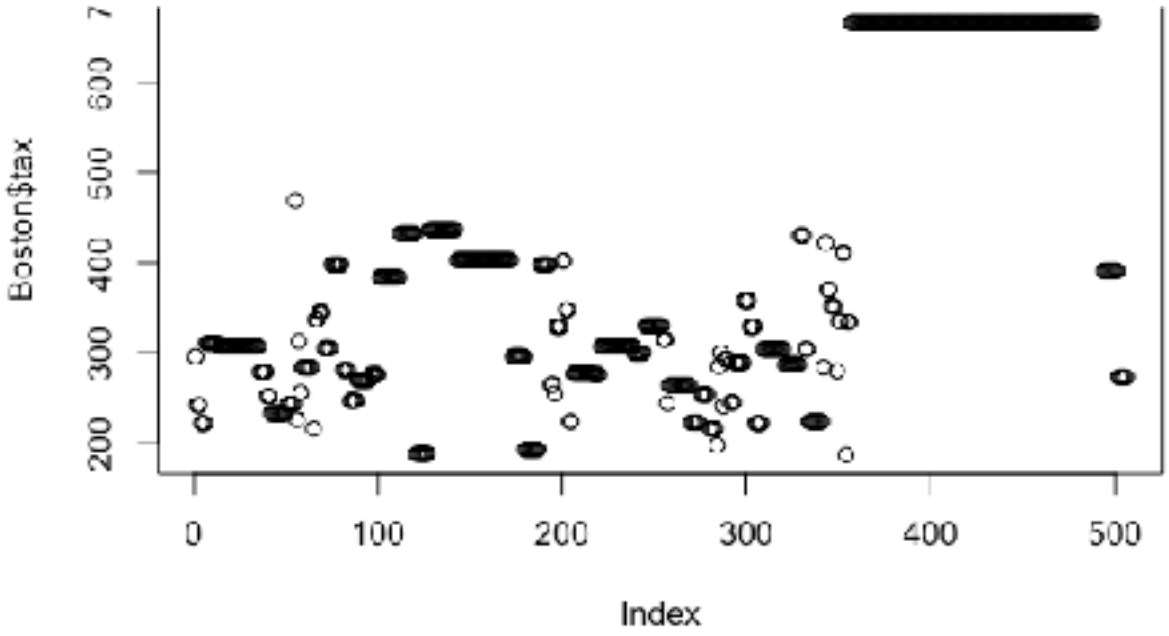
Part C.
> cor(Boston$tax, crime)
[1] 0.5827643

Part D





Part
E
>



houseriver <- subset(Boston,chas > 0)
> nrow(houseriver)
[1] 35

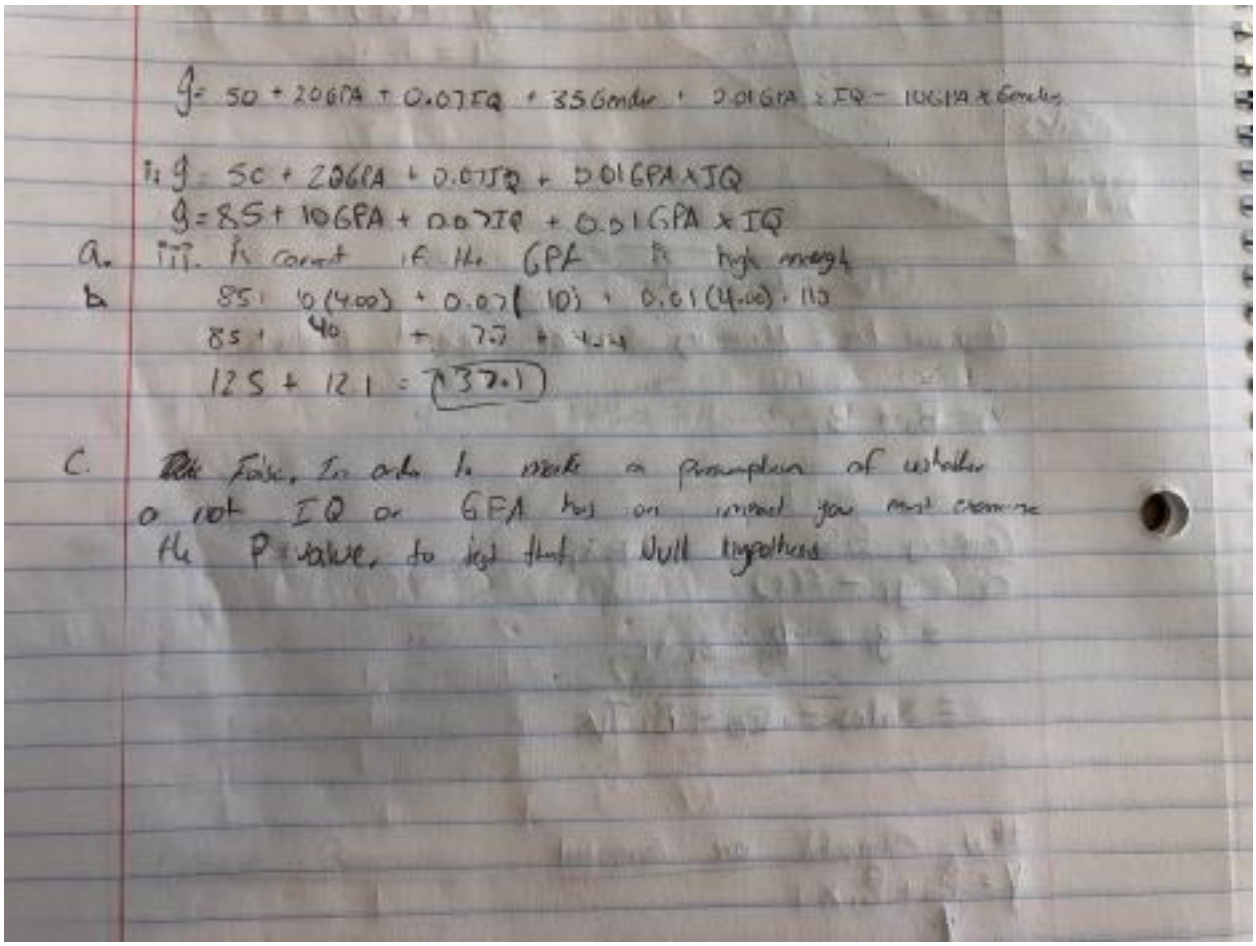
Part F
> median(Boston$ptratio)
[1] 19.05

Part G

```
> #I used an online reference to find out how to place the median values in order from smallest to greatest.
> medianValue <- Boston[order(Boston$medv),]
> medianValue[1,]
      crim zn indus chas   nox    rm age    dis rad tax ptratio black lstat medv
399 38.3518  0  18.1    0 0.693 5.453 100 1.4896  24 666    20.2 396.9 30.59    5
> summary(medianValue)
      crim                zn              indus            chas              nox              rm              age
 Min.   : 0.00632   Min.   :  0.00   Min.   : 0.46   Min.   :0.00000   Min.   :0.3850   Min.   :3.561   Min.   :  2.90
 1st Qu.: 0.08204   1st Qu.:  0.00   1st Qu.: 5.19   1st Qu.:0.00000   1st Qu.:0.4490   1st Qu.: 5.886   1st Qu.: 45.02
 Median : 0.25651   Median :  0.00   Median : 9.69   Median :0.00000   Median :0.5380   Median :6.208   Median : 77.50
 Mean   : 3.61352   Mean   : 11.36   Mean   :11.14   Mean   :0.06917   Mean   :0.5547   Mean   : 6.285   Mean   : 68.57
 3rd Qu.: 3.67708   3rd Qu.: 12.50   3rd Qu.:18.10   3rd Qu.:0.00000   3rd Qu.:0.6240   3rd Qu.: 6.623   3rd Qu.: 94.08
 Max.   :88.97620   Max.   :100.00   Max.   :27.74   Max.   :1.00000   Max.   :0.8710   Max.   : 8.780   Max.   :100.00
      dis              rad              tax            ptratio          black            lstat            medv
 Min.   : 1.130   Min.   : 1.000   Min.   :187.0   Min.   :12.60   Min.   :  0.32   Min.   : 1.73   Min.   : 5.00
 1st Qu.: 2.100   1st Qu.: 4.000   1st Qu.:279.0   1st Qu.:17.40   1st Qu.:375.38   1st Qu.: 6.95   1st Qu.:17.02
 Median : 3.207   Median : 5.000   Median :330.0   Median :19.05   Median :391.44   Median : 11.36   Median :21.20
 Mean   : 3.795   Mean   : 9.549   Mean   :408.2   Mean   :18.46   Mean   :356.67   Mean   :12.65   Mean   :22.53
 3rd Qu.: 5.188   3rd Qu.:24.000   3rd Qu.:666.0   3rd Qu.:20.20   3rd Qu.:396.23   3rd Qu.:16.95   3rd Qu.:25.00
 Max.   :12.127   Max.   :24.000   Max.   :711.0   Max.   :22.00   Max.   :396.90   Max.   :37.97   Max.   :50.00
```

```
> #h.
> #Found that subset was the best method to approaching this problem. I utilized an online resource. nrow also best
> #counted the number of rows, or properties that had greater than 7 rooms.
> #https://www.statmethods.net/management/subset.html
> room7 <- subset(Boston, rm>7)
> nrow(room7)
[1] 64
> room8 <- subset(Boston, rm>8)
> nrow(room8)
[1] 13
```

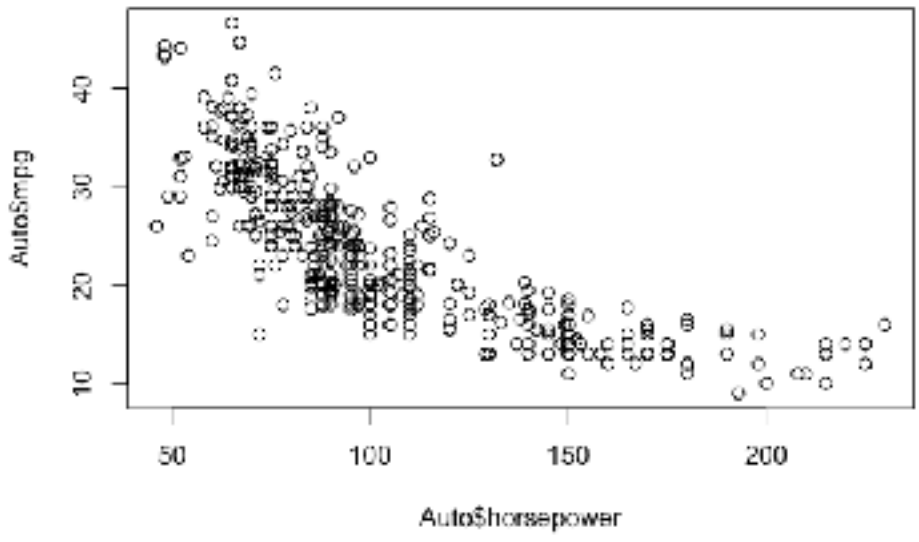
Chapter 3
Question 3

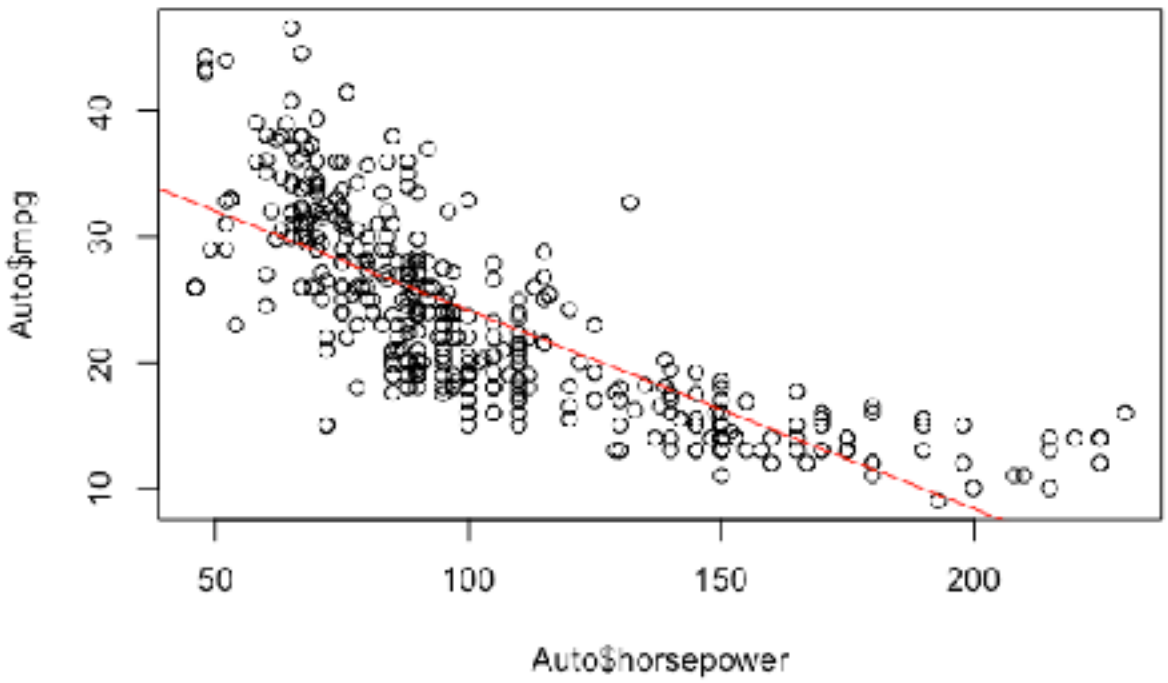


Question 8

```
> #a.
> autoRegression <- lm(mpg ~ horsepower, data = Auto)
> autoRegression

Call:
lm(formula = mpg ~ horsepower, data = Auto)

Coefficients:
(Intercept)   horsepower
    39.9359      -0.1578

> summary(autoRegression)
```

```
Call:
lm(formula = mpg ~ horsepower, data = Auto)

Residuals:
    Min      1Q  Median      3Q     Max
-13.5710  -3.2592  -0.3435   2.7630  16.9240

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 39.935861   0.717499   55.66   <2e-16 ***
horsepower  -0.157845   0.006446  -24.49   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.906 on 390 degrees of freedom
Multiple R-squared:  0.6059,  Adjusted R-squared:  0.6049
F-statistic: 599.7 on 1 and 390 DF,  p-value: < 2.2e-16


> #iii.
> cor(Auto$mpg,Auto$horsepower)
[1] -0.7784268
> #iv.
> #Found  this one in the book and online.
> predict(autoRegression, data.frame(horsepower = 98), interval = "confidence")
       fit      lwr      upr
1 24.46708 23.97308 24.96108
> predict(autoRegression, data.frame(horsepower = 98), interval = "prediction")
       fit     lwr      upr
1 24.46708 14.8094 34.12476
> #b.
> plot(Auto$horsepower, Auto$mpg)
>
```






```
> #c.
> par(mfrow = c(2,2))
> plot(autoRegression)
```