Assignment1\_autompg.R

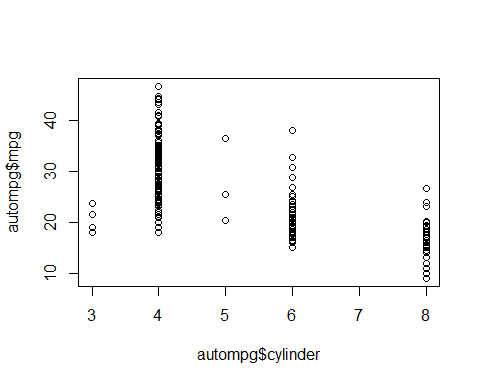
autompg <-read.csv(file.choose())  
#View(autompg)  
summary(autompg)

## mpg cylinder displacement horsepower   
## Min. : 9.00 Min. :3.000 Min. : 68.0 150 : 22   
## 1st Qu.:17.50 1st Qu.:4.000 1st Qu.:104.2 90 : 20   
## Median :23.00 Median :4.000 Median :148.5 88 : 19   
## Mean :23.51 Mean :5.455 Mean :193.4 110 : 18   
## 3rd Qu.:29.00 3rd Qu.:8.000 3rd Qu.:262.0 100 : 17   
## Max. :46.60 Max. :8.000 Max. :455.0 75 : 14   
## (Other):288   
## weight acceleration model.year origin   
## Min. :1613 Min. : 8.00 Min. :70.00 Min. :1.000   
## 1st Qu.:2224 1st Qu.:13.82 1st Qu.:73.00 1st Qu.:1.000   
## Median :2804 Median :15.50 Median :76.00 Median :1.000   
## Mean :2970 Mean :15.57 Mean :76.01 Mean :1.573   
## 3rd Qu.:3608 3rd Qu.:17.18 3rd Qu.:79.00 3rd Qu.:2.000   
## Max. :5140 Max. :24.80 Max. :82.00 Max. :3.000   
##   
## car.name   
## ford pinto : 6   
## amc matador : 5   
## ford maverick : 5   
## toyota corolla: 5   
## amc gremlin : 4   
## amc hornet : 4   
## (Other) :369

#structure of data  
str(autompg)

## 'data.frame': 398 obs. of 9 variables:  
## $ mpg : num 18 15 18 16 17 15 14 14 14 15 ...  
## $ cylinder : int 8 8 8 8 8 8 8 8 8 8 ...  
## $ displacement: num 307 350 318 304 302 429 454 440 455 390 ...  
## $ horsepower : Factor w/ 94 levels "?","100","102",..: 17 35 29 29 24 42 47 46 48 40 ...  
## $ weight : int 3504 3693 3436 3433 3449 4341 4354 4312 4425 3850 ...  
## $ acceleration: num 12 11.5 11 12 10.5 10 9 8.5 10 8.5 ...  
## $ model.year : int 70 70 70 70 70 70 70 70 70 70 ...  
## $ origin : int 1 1 1 1 1 1 1 1 1 1 ...  
## $ car.name : Factor w/ 305 levels "amc ambassador brougham",..: 50 37 232 15 162 142 55 224 242 2 ...

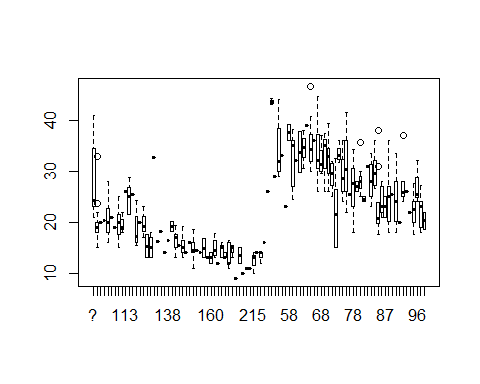
#Scatter Plot between mpg and cylinder  
plot(autompg$cylinder,autompg$mpg)



#Calculate the correlation between cylinder and mpg  
cor(autompg$cylinder,autompg$mpg)

## [1] -0.7753963

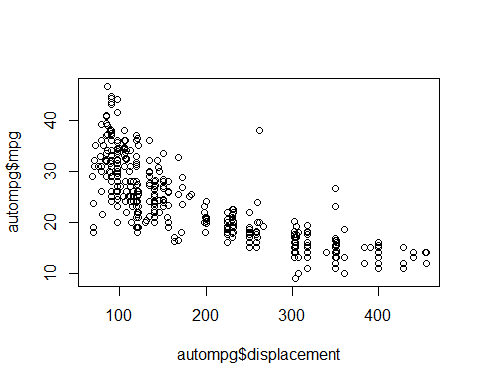
#Scatter Plot 3between mpg and horsepower  
plot(autompg$horsepower,autompg$mpg)



autompg$horsepower<-as.numeric(autompg$horsepower)  
#Calculate the correlation between cylinder and mpg  
cor(autompg$horsepower,autompg$mpg)

## [1] 0.4215846

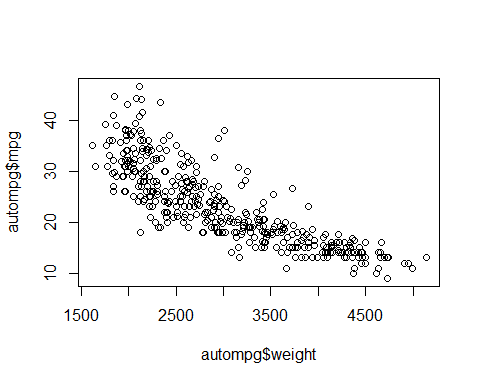
#Scatter Plot 4 between mpg and displacement  
plot(autompg$displacement,autompg$mpg)



#Calculate the correlation between mpg and displacement  
cor(autompg$displacement,autompg$mpg)

## [1] -0.8042028

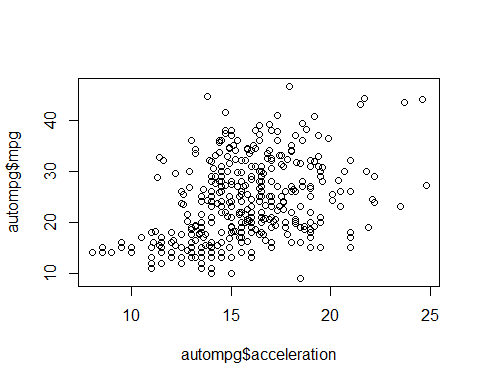
#Scatter Plot 5 between mpg and weight  
plot(autompg$weight,autompg$mpg)



#Calculate the correlation between mpg and weight  
cor(autompg$weight,autompg$mpg)

## [1] -0.8317409

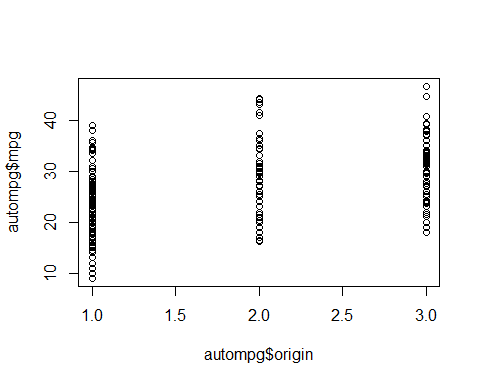
#Scatter Plot 6 between mpg and accelaration  
plot(autompg$acceleration,autompg$mpg)



#Calculate the correlation between mpg and acceleration  
cor(autompg$acceleration,autompg$mpg)

## [1] 0.4202889

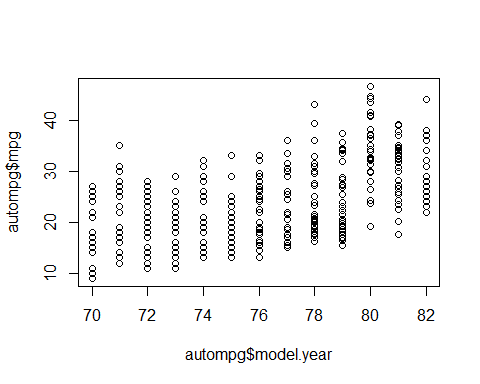
#Scatter Plot 7 between mpg and origin  
plot(autompg$origin,autompg$mpg)



#Calculate the correlation between mpg and origin  
cor(autompg$origin,autompg$mpg)

## [1] 0.5634504

#Scatter Plot 8 between mpg and model year  
plot(autompg$model.year,autompg$mpg)



#Calculate the correlation between mpg and model.year  
cor(autompg$model.year,autompg$mpg)

## [1] 0.5792671

#create first model for mpg and model.year  
  
  
model<-lm(mpg~model.year,data=autompg)  
summary(model)

##   
## Call:  
## lm(formula = mpg ~ model.year, data = autompg)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -12.024 -5.451 -0.390 4.947 18.200   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -69.55560 6.58911 -10.56 <2e-16 \*\*\*  
## model.year 1.22445 0.08659 14.14 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 6.379 on 396 degrees of freedom  
## Multiple R-squared: 0.3356, Adjusted R-squared: 0.3339   
## F-statistic: 200 on 1 and 396 DF, p-value: < 2.2e-16

# Intercept   
B0<-model$coefficients[1]  
B0

## (Intercept)   
## -69.5556

#slope  
  
B1<-model$coefficients[2]  
B1

## model.year   
## 1.224446

#Splitting the dataset into training and test  
  
training <- autompg[1:318,]  
training

## mpg cylinder displacement horsepower weight acceleration model.year  
## 1 18.0 8 307.0 17 3504 12.0 70  
## 2 15.0 8 350.0 35 3693 11.5 70  
## 3 18.0 8 318.0 29 3436 11.0 70  
## 4 16.0 8 304.0 29 3433 12.0 70  
## 5 17.0 8 302.0 24 3449 10.5 70  
## 6 15.0 8 429.0 42 4341 10.0 70  
## 7 14.0 8 454.0 47 4354 9.0 70  
## 8 14.0 8 440.0 46 4312 8.5 70  
## 9 14.0 8 455.0 48 4425 10.0 70  
## 10 15.0 8 390.0 40 3850 8.5 70  
## 11 15.0 8 383.0 37 3563 10.0 70  
## 12 14.0 8 340.0 34 3609 8.0 70  
## 13 15.0 8 400.0 29 3761 9.5 70  
## 14 14.0 8 455.0 48 3086 10.0 70  
## 15 24.0 4 113.0 91 2372 15.0 70  
## 16 22.0 6 198.0 91 2833 15.5 70  
## 17 18.0 6 199.0 93 2774 15.5 70  
## 18 21.0 6 200.0 81 2587 16.0 70  
## 19 27.0 4 97.0 84 2130 14.5 70  
## 20 26.0 4 97.0 50 1835 20.5 70  
## 21 25.0 4 110.0 83 2672 17.5 70  
## 22 24.0 4 107.0 86 2430 14.5 70  
## 23 25.0 4 104.0 91 2375 17.5 70  
## 24 26.0 4 121.0 10 2234 12.5 70  
## 25 21.0 6 199.0 86 2648 15.0 70  
## 26 10.0 8 360.0 46 4615 14.0 70  
## 27 10.0 8 307.0 43 4376 15.0 70  
## 28 11.0 8 318.0 45 4382 13.5 70  
## 29 9.0 8 304.0 41 4732 18.5 70  
## 30 27.0 4 97.0 84 2130 14.5 71  
## 31 28.0 4 140.0 86 2264 15.5 71  
## 32 25.0 4 113.0 91 2228 14.0 71  
## 33 25.0 4 98.0 1 2046 19.0 71  
## 34 19.0 6 232.0 2 2634 13.0 71  
## 35 16.0 6 225.0 5 3439 15.5 71  
## 36 17.0 6 250.0 2 3329 15.5 71  
## 37 19.0 6 250.0 84 3302 15.5 71  
## 38 18.0 6 232.0 2 3288 15.5 71  
## 39 14.0 8 350.0 35 4209 12.0 71  
## 40 14.0 8 400.0 38 4464 11.5 71  
## 41 14.0 8 351.0 31 4154 13.5 71  
## 42 14.0 8 318.0 29 4096 13.0 71  
## 43 12.0 8 383.0 39 4955 11.5 71  
## 44 13.0 8 400.0 37 4746 12.0 71  
## 45 13.0 8 400.0 38 5140 12.0 71  
## 46 18.0 6 258.0 8 2962 13.5 71  
## 47 22.0 4 140.0 69 2408 19.0 71  
## 48 19.0 6 250.0 2 3282 15.0 71  
## 49 18.0 6 250.0 84 3139 14.5 71  
## 50 23.0 4 122.0 82 2220 14.0 71  
## 51 28.0 4 116.0 86 2123 14.0 71  
## 52 30.0 4 79.0 67 2074 19.5 71  
## 53 30.0 4 88.0 72 2065 14.5 71  
## 54 31.0 4 71.0 62 1773 19.0 71  
## 55 35.0 4 72.0 66 1613 18.0 71  
## 56 27.0 4 97.0 57 1834 19.0 71  
## 57 26.0 4 91.0 67 1955 20.5 71  
## 58 24.0 4 113.0 91 2278 15.5 72  
## 59 25.0 4 97.5 76 2126 17.0 72  
## 60 23.0 4 97.0 55 2254 23.5 72  
## 61 20.0 4 140.0 86 2408 19.5 72  
## 62 21.0 4 122.0 82 2226 16.5 72  
## 63 13.0 8 350.0 35 4274 12.0 72  
## 64 14.0 8 400.0 38 4385 12.0 72  
## 65 15.0 8 318.0 29 4135 13.5 72  
## 66 14.0 8 351.0 31 4129 13.0 72  
## 67 17.0 8 304.0 29 3672 11.5 72  
## 68 11.0 8 429.0 44 4633 11.0 72  
## 69 13.0 8 350.0 32 4502 13.5 72  
## 70 12.0 8 350.0 34 4456 13.5 72  
## 71 13.0 8 400.0 40 4422 12.5 72  
## 72 19.0 3 70.0 93 2330 13.5 72  
## 73 15.0 8 304.0 29 3892 12.5 72  
## 74 13.0 8 307.0 17 4098 14.0 72  
## 75 13.0 8 302.0 24 4294 16.0 72  
## 76 14.0 8 318.0 29 4077 14.0 72  
## 77 18.0 4 121.0 9 2933 14.5 72  
## 78 22.0 4 121.0 72 2511 18.0 72  
## 79 21.0 4 120.0 83 2979 19.5 72  
## 80 26.0 4 96.0 66 2189 18.0 72  
## 81 22.0 4 122.0 82 2395 16.0 72  
## 82 28.0 4 97.0 88 2288 17.0 72  
## 83 23.0 4 120.0 93 2506 14.5 72  
## 84 28.0 4 98.0 76 2164 15.0 72  
## 85 27.0 4 97.0 84 2100 16.5 72  
## 86 13.0 8 350.0 38 4100 13.0 73  
## 87 14.0 8 304.0 29 3672 11.5 73  
## 88 13.0 8 350.0 26 3988 13.0 73  
## 89 14.0 8 302.0 21 4042 14.5 73  
## 90 15.0 8 318.0 29 3777 12.5 73  
## 91 12.0 8 429.0 42 4952 11.5 73  
## 92 13.0 8 400.0 29 4464 12.0 73  
## 93 13.0 8 351.0 33 4363 13.0 73  
## 94 14.0 8 318.0 29 4237 14.5 73  
## 95 13.0 8 440.0 46 4735 11.0 73  
## 96 12.0 8 455.0 48 4951 11.0 73  
## 97 13.0 8 360.0 38 3821 11.0 73  
## 98 18.0 6 225.0 5 3121 16.5 73  
## 99 16.0 6 250.0 2 3278 18.0 73  
## 100 18.0 6 232.0 2 2945 16.0 73  
## 101 18.0 6 250.0 84 3021 16.5 73  
## 102 23.0 6 198.0 91 2904 16.0 73  
## 103 26.0 4 97.0 50 1950 21.0 73  
## 104 11.0 8 400.0 29 4997 14.0 73  
## 105 12.0 8 400.0 36 4906 12.5 73  
## 106 13.0 8 360.0 37 4654 13.0 73  
## 107 12.0 8 350.0 39 4499 12.5 73  
## 108 18.0 6 232.0 2 2789 15.0 73  
## 109 20.0 4 97.0 84 2279 19.0 73  
## 110 21.0 4 140.0 69 2401 19.5 73  
## 111 22.0 4 108.0 90 2379 16.5 73  
## 112 18.0 3 70.0 86 2124 13.5 73  
## 113 19.0 4 122.0 81 2310 18.5 73  
## 114 21.0 6 155.0 6 2472 14.0 73  
## 115 26.0 4 98.0 86 2265 15.5 73  
## 116 15.0 8 350.0 26 4082 13.0 73  
## 117 16.0 8 400.0 49 4278 9.5 73  
## 118 29.0 4 68.0 52 1867 19.5 73  
## 119 24.0 4 116.0 71 2158 15.5 73  
## 120 20.0 4 114.0 87 2582 14.0 73  
## 121 19.0 4 121.0 9 2868 15.5 73  
## 122 15.0 8 318.0 29 3399 11.0 73  
## 123 24.0 4 121.0 8 2660 14.0 73  
## 124 20.0 6 156.0 14 2807 13.5 73  
## 125 11.0 8 350.0 39 3664 11.0 73  
## 126 20.0 6 198.0 91 3102 16.5 74  
## 127 21.0 6 200.0 1 2875 17.0 74  
## 128 19.0 6 232.0 2 2901 16.0 74  
## 129 15.0 6 250.0 2 3336 17.0 74  
## 130 31.0 4 79.0 64 1950 19.0 74  
## 131 26.0 4 122.0 76 2451 16.5 74  
## 132 32.0 4 71.0 62 1836 21.0 74  
## 133 25.0 4 140.0 71 2542 17.0 74  
## 134 16.0 6 250.0 2 3781 17.0 74  
## 135 16.0 6 258.0 8 3632 18.0 74  
## 136 18.0 6 225.0 5 3613 16.5 74  
## 137 16.0 8 302.0 24 4141 14.0 74  
## 138 13.0 8 350.0 29 4699 14.5 74  
## 139 14.0 8 318.0 29 4457 13.5 74  
## 140 14.0 8 302.0 24 4638 16.0 74  
## 141 14.0 8 304.0 29 4257 15.5 74  
## 142 29.0 4 98.0 79 2219 16.5 74  
## 143 26.0 4 79.0 64 1963 15.5 74  
## 144 26.0 4 97.0 74 2300 14.5 74  
## 145 31.0 4 76.0 53 1649 16.5 74  
## 146 32.0 4 83.0 58 2003 19.0 74  
## 147 28.0 4 90.0 71 2125 14.5 74  
## 148 24.0 4 90.0 71 2108 15.5 74  
## 149 26.0 4 116.0 71 2246 14.0 74  
## 150 24.0 4 120.0 93 2489 15.0 74  
## 151 26.0 4 108.0 89 2391 15.5 74  
## 152 31.0 4 79.0 64 2000 16.0 74  
## 153 19.0 6 225.0 91 3264 16.0 75  
## 154 18.0 6 250.0 5 3459 16.0 75  
## 155 15.0 6 250.0 69 3432 21.0 75  
## 156 15.0 6 250.0 69 3158 19.5 75  
## 157 16.0 8 400.0 37 4668 11.5 75  
## 158 15.0 8 350.0 26 4440 14.0 75  
## 159 16.0 8 318.0 29 4498 14.5 75  
## 160 14.0 8 351.0 27 4657 13.5 75  
## 161 17.0 6 231.0 8 3907 21.0 75  
## 162 16.0 6 250.0 5 3897 18.5 75  
## 163 15.0 6 258.0 8 3730 19.0 75  
## 164 18.0 6 225.0 91 3785 19.0 75  
## 165 21.0 6 231.0 8 3039 15.0 75  
## 166 20.0 8 262.0 8 3221 13.5 75  
## 167 13.0 8 302.0 16 3169 12.0 75  
## 168 29.0 4 97.0 71 2171 16.0 75  
## 169 23.0 4 140.0 79 2639 17.0 75  
## 170 20.0 6 232.0 2 2914 16.0 75  
## 171 23.0 4 140.0 74 2592 18.5 75  
## 172 24.0 4 134.0 92 2702 13.5 75  
## 173 25.0 4 90.0 68 2223 16.5 75  
## 174 24.0 4 119.0 93 2545 17.0 75  
## 175 18.0 6 171.0 93 2984 14.5 75  
## 176 29.0 4 90.0 67 1937 14.0 75  
## 177 19.0 6 232.0 86 3211 17.0 75  
## 178 23.0 4 115.0 91 2694 15.0 75  
## 179 23.0 4 120.0 84 2957 17.0 75  
## 180 22.0 4 121.0 94 2945 14.5 75  
## 181 25.0 4 121.0 11 2671 13.5 75  
## 182 33.0 4 91.0 54 1795 17.5 75  
## 183 28.0 4 107.0 82 2464 15.5 76  
## 184 25.0 4 116.0 77 2220 16.9 76  
## 185 25.0 4 140.0 88 2572 14.9 76  
## 186 26.0 4 98.0 75 2255 17.7 76  
## 187 27.0 4 101.0 79 2202 15.3 76  
## 188 17.5 8 305.0 24 4215 13.0 76  
## 189 16.0 8 318.0 29 4190 13.0 76  
## 190 15.5 8 304.0 13 3962 13.9 76  
## 191 14.5 8 351.0 30 4215 12.8 76  
## 192 22.0 6 225.0 2 3233 15.4 76  
## 193 22.0 6 250.0 5 3353 14.5 76  
## 194 24.0 6 200.0 77 3012 17.6 76  
## 195 22.5 6 232.0 86 3085 17.6 76  
## 196 29.0 4 85.0 53 2035 22.2 76  
## 197 24.5 4 98.0 57 2164 22.1 76  
## 198 29.0 4 90.0 67 1937 14.2 76  
## 199 33.0 4 91.0 54 1795 17.4 76  
## 200 20.0 6 225.0 2 3651 17.7 76  
## 201 18.0 6 250.0 74 3574 21.0 76  
## 202 18.5 6 250.0 8 3645 16.2 76  
## 203 17.5 6 258.0 91 3193 17.8 76  
## 204 29.5 4 97.0 68 1825 12.2 76  
## 205 32.0 4 85.0 67 1990 17.0 76  
## 206 28.0 4 97.0 71 2155 16.4 76  
## 207 26.5 4 140.0 69 2565 13.6 76  
## 208 20.0 4 130.0 3 3150 15.7 76  
## 209 13.0 8 318.0 29 3940 13.2 76  
## 210 19.0 4 120.0 84 3270 21.9 76  
## 211 19.0 6 156.0 7 2930 15.5 76  
## 212 16.5 6 168.0 13 3820 16.7 76  
## 213 16.5 8 350.0 39 4380 12.1 76  
## 214 13.0 8 350.0 26 4055 12.0 76  
## 215 13.0 8 302.0 17 3870 15.0 76  
## 216 13.0 8 318.0 29 3755 14.0 76  
## 217 31.5 4 98.0 65 2045 18.5 77  
## 218 30.0 4 111.0 76 2155 14.8 77  
## 219 36.0 4 79.0 56 1825 18.6 77  
## 220 25.5 4 122.0 92 2300 15.5 77  
## 221 33.5 4 85.0 67 1945 16.8 77  
## 222 17.5 8 305.0 26 3880 12.5 77  
## 223 17.0 8 260.0 8 4060 19.0 77  
## 224 15.5 8 318.0 26 4140 13.7 77  
## 225 15.0 8 302.0 17 4295 14.9 77  
## 226 17.5 6 250.0 8 3520 16.4 77  
## 227 20.5 6 231.0 5 3425 16.9 77  
## 228 19.0 6 225.0 2 3630 17.7 77  
## 229 18.5 6 250.0 94 3525 19.0 77  
## 230 16.0 8 400.0 39 4220 11.1 77  
## 231 15.5 8 350.0 37 4165 11.4 77  
## 232 15.5 8 400.0 40 4325 12.2 77  
## 233 16.0 8 351.0 28 4335 14.5 77  
## 234 29.0 4 97.0 74 1940 14.5 77  
## 235 24.5 4 151.0 84 2740 16.0 77  
## 236 26.0 4 97.0 71 2265 18.2 77  
## 237 25.5 4 140.0 85 2755 15.8 77  
## 238 30.5 4 98.0 60 2051 17.0 77  
## 239 33.5 4 98.0 79 2075 15.9 77  
## 240 30.0 4 97.0 64 1985 16.4 77  
## 241 30.5 4 97.0 74 2190 14.1 77  
## 242 22.0 6 146.0 93 2815 14.5 77  
## 243 21.5 4 121.0 8 2600 12.8 77  
## 244 21.5 3 80.0 8 2720 13.5 77  
## 245 43.1 4 90.0 51 1985 21.5 78  
## 246 36.1 4 98.0 63 1800 14.4 78  
## 247 32.8 4 78.0 53 1985 19.4 78  
## 248 39.4 4 85.0 67 2070 18.6 78  
## 249 36.1 4 91.0 57 1800 16.4 78  
## 250 19.9 8 260.0 8 3365 15.5 78  
## 251 19.4 8 318.0 24 3735 13.2 78  
## 252 20.2 8 302.0 23 3570 12.8 78  
## 253 19.2 6 231.0 5 3535 19.2 78  
## 254 20.5 6 200.0 91 3155 18.2 78  
## 255 20.2 6 200.0 81 2965 15.8 78  
## 256 25.1 4 140.0 84 2720 15.4 78  
## 257 20.5 6 225.0 2 3430 17.2 78  
## 258 19.4 6 232.0 86 3210 17.2 78  
## 259 20.6 6 231.0 5 3380 15.8 78  
## 260 20.8 6 200.0 81 3070 16.7 78  
## 261 18.6 6 225.0 8 3620 18.7 78  
## 262 18.1 6 258.0 13 3410 15.1 78  
## 263 19.2 8 305.0 26 3425 13.2 78  
## 264 17.7 6 231.0 35 3445 13.4 78  
## 265 18.1 8 302.0 23 3205 11.2 78  
## 266 17.5 8 318.0 24 4080 13.7 78  
## 267 30.0 4 98.0 65 2155 16.5 78  
## 268 27.5 4 134.0 91 2560 14.2 78  
## 269 27.2 4 119.0 93 2300 14.7 78  
## 270 30.9 4 105.0 71 2230 14.5 78  
## 271 21.1 4 134.0 91 2515 14.8 78  
## 272 23.2 4 156.0 5 2745 16.7 78  
## 273 23.8 4 151.0 81 2855 17.6 78  
## 274 23.9 4 119.0 93 2405 14.9 78  
## 275 20.3 5 131.0 4 2830 15.9 78  
## 276 17.0 6 163.0 15 3140 13.6 78  
## 277 21.6 4 121.0 11 2795 15.7 78  
## 278 16.2 6 163.0 19 3410 15.8 78  
## 279 31.5 4 89.0 68 1990 14.9 78  
## 280 29.5 4 98.0 65 2135 16.6 78  
## 281 21.5 6 231.0 11 3245 15.4 79  
## 282 19.8 6 200.0 81 2990 18.2 79  
## 283 22.3 4 140.0 84 2890 17.3 79  
## 284 20.2 6 232.0 86 3265 18.2 79  
## 285 20.6 6 225.0 8 3360 16.6 79  
## 286 17.0 8 305.0 17 3840 15.4 79  
## 287 17.6 8 302.0 16 3725 13.4 79  
## 288 16.5 8 351.0 22 3955 13.2 79  
## 289 18.2 8 318.0 20 3830 15.2 79  
## 290 16.9 8 350.0 32 4360 14.9 79  
## 291 15.5 8 351.0 25 4054 14.3 79  
## 292 19.2 8 267.0 15 3605 15.0 79  
## 293 18.5 8 360.0 29 3940 13.0 79  
## 294 31.9 4 89.0 68 1925 14.0 79  
## 295 34.1 4 86.0 62 1975 15.2 79  
## 296 35.7 4 98.0 76 1915 14.4 79  
## 297 27.4 4 121.0 76 2670 15.0 79  
## 298 25.4 5 183.0 73 3530 20.1 79  
## 299 23.0 8 350.0 15 3900 17.4 79  
## 300 27.2 4 141.0 68 3190 24.8 79  
## 301 23.9 8 260.0 86 3420 22.2 79  
## 302 34.2 4 105.0 67 2200 13.2 79  
## 303 34.5 4 105.0 67 2150 14.9 79  
## 304 31.8 4 85.0 62 2020 19.2 79  
## 305 37.3 4 91.0 66 2130 14.7 79  
## 306 28.4 4 151.0 86 2670 16.0 79  
## 307 28.8 6 173.0 11 2595 11.3 79  
## 308 26.8 6 173.0 11 2700 12.9 79  
## 309 33.5 4 151.0 86 2556 13.2 79  
## 310 41.5 4 98.0 72 2144 14.7 80  
## 311 38.1 4 89.0 57 1968 18.8 80  
## 312 32.1 4 98.0 67 2120 15.5 80  
## 313 37.2 4 86.0 62 2019 16.4 80  
## 314 28.0 4 151.0 86 2678 16.5 80  
## 315 26.4 4 140.0 84 2870 18.1 80  
## 316 24.3 4 151.0 86 3003 20.1 80  
## 317 19.1 6 225.0 86 3381 18.7 80  
## 318 34.3 4 97.0 74 2188 15.8 80  
## origin car.name  
## 1 1 chevrolet chevelle malibu  
## 2 1 buick skylark 320  
## 3 1 plymouth satellite  
## 4 1 amc rebel sst  
## 5 1 ford torino  
## 6 1 ford galaxie 500  
## 7 1 chevrolet impala  
## 8 1 plymouth fury iii  
## 9 1 pontiac catalina  
## 10 1 amc ambassador dpl  
## 11 1 dodge challenger se  
## 12 1 plymouth 'cuda 340  
## 13 1 chevrolet monte carlo  
## 14 1 buick estate wagon (sw)  
## 15 3 toyota corona mark ii  
## 16 1 plymouth duster  
## 17 1 amc hornet  
## 18 1 ford maverick  
## 19 3 datsun pl510  
## 20 2 volkswagen 1131 deluxe sedan  
## 21 2 peugeot 504  
## 22 2 audi 100 ls  
## 23 2 saab 99e  
## 24 2 bmw 2002  
## 25 1 amc gremlin  
## 26 1 ford f250  
## 27 1 chevy c20  
## 28 1 dodge d200  
## 29 1 hi 1200d  
## 30 3 datsun pl510  
## 31 1 chevrolet vega 2300  
## 32 3 toyota corona  
## 33 1 ford pinto  
## 34 1 amc gremlin  
## 35 1 plymouth satellite custom  
## 36 1 chevrolet chevelle malibu  
## 37 1 ford torino 500  
## 38 1 amc matador  
## 39 1 chevrolet impala  
## 40 1 pontiac catalina brougham  
## 41 1 ford galaxie 500  
## 42 1 plymouth fury iii  
## 43 1 dodge monaco (sw)  
## 44 1 ford country squire (sw)  
## 45 1 pontiac safari (sw)  
## 46 1 amc hornet sportabout (sw)  
## 47 1 chevrolet vega (sw)  
## 48 1 pontiac firebird  
## 49 1 ford mustang  
## 50 1 mercury capri 2000  
## 51 2 opel 1900  
## 52 2 peugeot 304  
## 53 2 fiat 124b  
## 54 3 toyota corolla 1200  
## 55 3 datsun 1200  
## 56 2 volkswagen model 111  
## 57 1 plymouth cricket  
## 58 3 toyota corona hardtop  
## 59 1 dodge colt hardtop  
## 60 2 volkswagen type 3  
## 61 1 chevrolet vega  
## 62 1 ford pinto runabout  
## 63 1 chevrolet impala  
## 64 1 pontiac catalina  
## 65 1 plymouth fury iii  
## 66 1 ford galaxie 500  
## 67 1 amc ambassador sst  
## 68 1 mercury marquis  
## 69 1 buick lesabre custom  
## 70 1 oldsmobile delta 88 royale  
## 71 1 chrysler newport royal  
## 72 3 mazda rx2 coupe  
## 73 1 amc matador (sw)  
## 74 1 chevrolet chevelle concours (sw)  
## 75 1 ford gran torino (sw)  
## 76 1 plymouth satellite custom (sw)  
## 77 2 volvo 145e (sw)  
## 78 2 volkswagen 411 (sw)  
## 79 2 peugeot 504 (sw)  
## 80 2 renault 12 (sw)  
## 81 1 ford pinto (sw)  
## 82 3 datsun 510 (sw)  
## 83 3 toyouta corona mark ii (sw)  
## 84 1 dodge colt (sw)  
## 85 3 toyota corolla 1600 (sw)  
## 86 1 buick century 350  
## 87 1 amc matador  
## 88 1 chevrolet malibu  
## 89 1 ford gran torino  
## 90 1 dodge coronet custom  
## 91 1 mercury marquis brougham  
## 92 1 chevrolet caprice classic  
## 93 1 ford ltd  
## 94 1 plymouth fury gran sedan  
## 95 1 chrysler new yorker brougham  
## 96 1 buick electra 225 custom  
## 97 1 amc ambassador brougham  
## 98 1 plymouth valiant  
## 99 1 chevrolet nova custom  
## 100 1 amc hornet  
## 101 1 ford maverick  
## 102 1 plymouth duster  
## 103 2 volkswagen super beetle  
## 104 1 chevrolet impala  
## 105 1 ford country  
## 106 1 plymouth custom suburb  
## 107 1 oldsmobile vista cruiser  
## 108 1 amc gremlin  
## 109 3 toyota carina  
## 110 1 chevrolet vega  
## 111 3 datsun 610  
## 112 3 maxda rx3  
## 113 1 ford pinto  
## 114 1 mercury capri v6  
## 115 2 fiat 124 sport coupe  
## 116 1 chevrolet monte carlo s  
## 117 1 pontiac grand prix  
## 118 2 fiat 128  
## 119 2 opel manta  
## 120 2 audi 100ls  
## 121 2 volvo 144ea  
## 122 1 dodge dart custom  
## 123 2 saab 99le  
## 124 3 toyota mark ii  
## 125 1 oldsmobile omega  
## 126 1 plymouth duster  
## 127 1 ford maverick  
## 128 1 amc hornet  
## 129 1 chevrolet nova  
## 130 3 datsun b210  
## 131 1 ford pinto  
## 132 3 toyota corolla 1200  
## 133 1 chevrolet vega  
## 134 1 chevrolet chevelle malibu classic  
## 135 1 amc matador  
## 136 1 plymouth satellite sebring  
## 137 1 ford gran torino  
## 138 1 buick century luxus (sw)  
## 139 1 dodge coronet custom (sw)  
## 140 1 ford gran torino (sw)  
## 141 1 amc matador (sw)  
## 142 2 audi fox  
## 143 2 volkswagen dasher  
## 144 2 opel manta  
## 145 3 toyota corona  
## 146 3 datsun 710  
## 147 1 dodge colt  
## 148 2 fiat 128  
## 149 2 fiat 124 tc  
## 150 3 honda civic  
## 151 3 subaru  
## 152 2 fiat x1.9  
## 153 1 plymouth valiant custom  
## 154 1 chevrolet nova  
## 155 1 mercury monarch  
## 156 1 ford maverick  
## 157 1 pontiac catalina  
## 158 1 chevrolet bel air  
## 159 1 plymouth grand fury  
## 160 1 ford ltd  
## 161 1 buick century  
## 162 1 chevroelt chevelle malibu  
## 163 1 amc matador  
## 164 1 plymouth fury  
## 165 1 buick skyhawk  
## 166 1 chevrolet monza 2+2  
## 167 1 ford mustang ii  
## 168 3 toyota corolla  
## 169 1 ford pinto  
## 170 1 amc gremlin  
## 171 1 pontiac astro  
## 172 3 toyota corona  
## 173 2 volkswagen dasher  
## 174 3 datsun 710  
## 175 1 ford pinto  
## 176 2 volkswagen rabbit  
## 177 1 amc pacer  
## 178 2 audi 100ls  
## 179 2 peugeot 504  
## 180 2 volvo 244dl  
## 181 2 saab 99le  
## 182 3 honda civic cvcc  
## 183 2 fiat 131  
## 184 2 opel 1900  
## 185 1 capri ii  
## 186 1 dodge colt  
## 187 2 renault 12tl  
## 188 1 chevrolet chevelle malibu classic  
## 189 1 dodge coronet brougham  
## 190 1 amc matador  
## 191 1 ford gran torino  
## 192 1 plymouth valiant  
## 193 1 chevrolet nova  
## 194 1 ford maverick  
## 195 1 amc hornet  
## 196 1 chevrolet chevette  
## 197 1 chevrolet woody  
## 198 2 vw rabbit  
## 199 3 honda civic  
## 200 1 dodge aspen se  
## 201 1 ford granada ghia  
## 202 1 pontiac ventura sj  
## 203 1 amc pacer d/l  
## 204 2 volkswagen rabbit  
## 205 3 datsun b-210  
## 206 3 toyota corolla  
## 207 1 ford pinto  
## 208 2 volvo 245  
## 209 1 plymouth volare premier v8  
## 210 2 peugeot 504  
## 211 3 toyota mark ii  
## 212 2 mercedes-benz 280s  
## 213 1 cadillac seville  
## 214 1 chevy c10  
## 215 1 ford f108  
## 216 1 dodge d100  
## 217 3 honda accord cvcc  
## 218 1 buick opel isuzu deluxe  
## 219 2 renault 5 gtl  
## 220 1 plymouth arrow gs  
## 221 3 datsun f-10 hatchback  
## 222 1 chevrolet caprice classic  
## 223 1 oldsmobile cutlass supreme  
## 224 1 dodge monaco brougham  
## 225 1 mercury cougar brougham  
## 226 1 chevrolet concours  
## 227 1 buick skylark  
## 228 1 plymouth volare custom  
## 229 1 ford granada  
## 230 1 pontiac grand prix lj  
## 231 1 chevrolet monte carlo landau  
## 232 1 chrysler cordoba  
## 233 1 ford thunderbird  
## 234 2 volkswagen rabbit custom  
## 235 1 pontiac sunbird coupe  
## 236 3 toyota corolla liftback  
## 237 1 ford mustang ii 2+2  
## 238 1 chevrolet chevette  
## 239 1 dodge colt m/m  
## 240 3 subaru dl  
## 241 2 volkswagen dasher  
## 242 3 datsun 810  
## 243 2 bmw 320i  
## 244 3 mazda rx-4  
## 245 2 volkswagen rabbit custom diesel  
## 246 1 ford fiesta  
## 247 3 mazda glc deluxe  
## 248 3 datsun b210 gx  
## 249 3 honda civic cvcc  
## 250 1 oldsmobile cutlass salon brougham  
## 251 1 dodge diplomat  
## 252 1 mercury monarch ghia  
## 253 1 pontiac phoenix lj  
## 254 1 chevrolet malibu  
## 255 1 ford fairmont (auto)  
## 256 1 ford fairmont (man)  
## 257 1 plymouth volare  
## 258 1 amc concord  
## 259 1 buick century special  
## 260 1 mercury zephyr  
## 261 1 dodge aspen  
## 262 1 amc concord d/l  
## 263 1 chevrolet monte carlo landau  
## 264 1 buick regal sport coupe (turbo)  
## 265 1 ford futura  
## 266 1 dodge magnum xe  
## 267 1 chevrolet chevette  
## 268 3 toyota corona  
## 269 3 datsun 510  
## 270 1 dodge omni  
## 271 3 toyota celica gt liftback  
## 272 1 plymouth sapporo  
## 273 1 oldsmobile starfire sx  
## 274 3 datsun 200-sx  
## 275 2 audi 5000  
## 276 2 volvo 264gl  
## 277 2 saab 99gle  
## 278 2 peugeot 604sl  
## 279 2 volkswagen scirocco  
## 280 3 honda accord lx  
## 281 1 pontiac lemans v6  
## 282 1 mercury zephyr 6  
## 283 1 ford fairmont 4  
## 284 1 amc concord dl 6  
## 285 1 dodge aspen 6  
## 286 1 chevrolet caprice classic  
## 287 1 ford ltd landau  
## 288 1 mercury grand marquis  
## 289 1 dodge st. regis  
## 290 1 buick estate wagon (sw)  
## 291 1 ford country squire (sw)  
## 292 1 chevrolet malibu classic (sw)  
## 293 1 chrysler lebaron town @ country (sw)  
## 294 2 vw rabbit custom  
## 295 3 maxda glc deluxe  
## 296 1 dodge colt hatchback custom  
## 297 1 amc spirit dl  
## 298 2 mercedes benz 300d  
## 299 1 cadillac eldorado  
## 300 2 peugeot 504  
## 301 1 oldsmobile cutlass salon brougham  
## 302 1 plymouth horizon  
## 303 1 plymouth horizon tc3  
## 304 3 datsun 210  
## 305 2 fiat strada custom  
## 306 1 buick skylark limited  
## 307 1 chevrolet citation  
## 308 1 oldsmobile omega brougham  
## 309 1 pontiac phoenix  
## 310 2 vw rabbit  
## 311 3 toyota corolla tercel  
## 312 1 chevrolet chevette  
## 313 3 datsun 310  
## 314 1 chevrolet citation  
## 315 1 ford fairmont  
## 316 1 amc concord  
## 317 1 dodge aspen  
## 318 2 audi 4000

test<- autompg[319:398,]  
test

## mpg cylinder displacement horsepower weight acceleration model.year  
## 319 29.8 4 134 86 2711 15.5 80  
## 320 31.3 4 120 71 2542 17.5 80  
## 321 37.0 4 119 88 2434 15.0 80  
## 322 32.2 4 108 71 2265 15.2 80  
## 323 46.6 4 86 62 2110 17.9 80  
## 324 27.9 4 156 5 2800 14.4 80  
## 325 40.8 4 85 62 2110 19.2 80  
## 326 44.3 4 90 51 2085 21.7 80  
## 327 43.4 4 90 51 2335 23.7 80  
## 328 36.4 5 121 64 2950 19.9 80  
## 329 30.0 4 146 64 3250 21.8 80  
## 330 44.6 4 91 64 1850 13.8 80  
## 331 40.9 4 85 1 1835 17.3 80  
## 332 33.8 4 97 64 2145 18.0 80  
## 333 29.8 4 89 59 1845 15.3 80  
## 334 32.7 6 168 18 2910 11.4 80  
## 335 23.7 3 70 2 2420 12.5 80  
## 336 35.0 4 122 84 2500 15.1 80  
## 337 23.6 4 140 1 2905 14.3 80  
## 338 32.4 4 107 69 2290 17.0 80  
## 339 27.2 4 135 80 2490 15.7 81  
## 340 26.6 4 151 80 2635 16.4 81  
## 341 25.8 4 156 88 2620 14.4 81  
## 342 23.5 6 173 8 2725 12.6 81  
## 343 30.0 4 135 80 2385 12.9 81  
## 344 39.1 4 79 56 1755 16.9 81  
## 345 39.0 4 86 61 1875 16.4 81  
## 346 35.1 4 81 57 1760 16.1 81  
## 347 32.3 4 97 64 2065 17.8 81  
## 348 37.0 4 85 62 1975 19.4 81  
## 349 37.7 4 89 59 2050 17.3 81  
## 350 34.1 4 91 65 1985 16.0 81  
## 351 34.7 4 105 60 2215 14.9 81  
## 352 34.4 4 98 62 2045 16.2 81  
## 353 29.9 4 98 62 2380 20.7 81  
## 354 33.0 4 105 70 2190 14.2 81  
## 355 34.5 4 100 1 2320 15.8 81  
## 356 33.7 4 107 71 2210 14.4 81  
## 357 32.4 4 108 71 2350 16.8 81  
## 358 32.9 4 119 2 2615 14.8 81  
## 359 31.6 4 120 70 2635 18.3 81  
## 360 28.1 4 141 76 3230 20.4 81  
## 361 30.7 6 145 72 3160 19.6 81  
## 362 25.4 6 168 12 2900 12.6 81  
## 363 24.2 6 146 13 2930 13.8 81  
## 364 22.4 6 231 8 3415 15.8 81  
## 365 26.6 8 350 5 3725 19.0 81  
## 366 20.2 6 200 84 3060 17.1 81  
## 367 17.6 6 225 81 3465 16.6 81  
## 368 28.0 4 112 84 2605 19.6 82  
## 369 27.0 4 112 84 2640 18.6 82  
## 370 34.0 4 112 84 2395 18.0 82  
## 371 31.0 4 112 81 2575 16.2 82  
## 372 29.0 4 135 80 2525 16.0 82  
## 373 27.0 4 151 86 2735 18.0 82  
## 374 24.0 4 140 88 2865 16.4 82  
## 375 23.0 4 151 1 3035 20.5 82  
## 376 36.0 4 105 70 1980 15.3 82  
## 377 37.0 4 91 65 2025 18.2 82  
## 378 31.0 4 91 65 1970 17.6 82  
## 379 38.0 4 105 60 2125 14.7 82  
## 380 36.0 4 98 67 2125 17.3 82  
## 381 36.0 4 120 84 2160 14.5 82  
## 382 36.0 4 107 71 2205 14.5 82  
## 383 34.0 4 108 67 2245 16.9 82  
## 384 38.0 4 91 64 1965 15.0 82  
## 385 32.0 4 91 64 1965 15.7 82  
## 386 38.0 4 91 64 1995 16.2 82  
## 387 25.0 6 181 8 2945 16.4 82  
## 388 38.0 6 262 81 3015 17.0 82  
## 389 26.0 4 156 88 2585 14.5 82  
## 390 22.0 6 232 9 2835 14.7 82  
## 391 32.0 4 144 92 2665 13.9 82  
## 392 36.0 4 135 80 2370 13.0 82  
## 393 27.0 4 151 86 2950 17.3 82  
## 394 27.0 4 140 82 2790 15.6 82  
## 395 44.0 4 97 53 2130 24.6 82  
## 396 32.0 4 135 80 2295 11.6 82  
## 397 28.0 4 120 75 2625 18.6 82  
## 398 31.0 4 119 78 2720 19.4 82  
## origin car.name  
## 319 3 toyota corona liftback  
## 320 3 mazda 626  
## 321 3 datsun 510 hatchback  
## 322 3 toyota corolla  
## 323 3 mazda glc  
## 324 1 dodge colt  
## 325 3 datsun 210  
## 326 2 vw rabbit c (diesel)  
## 327 2 vw dasher (diesel)  
## 328 2 audi 5000s (diesel)  
## 329 2 mercedes-benz 240d  
## 330 3 honda civic 1500 gl  
## 331 2 renault lecar deluxe  
## 332 3 subaru dl  
## 333 2 vokswagen rabbit  
## 334 3 datsun 280-zx  
## 335 3 mazda rx-7 gs  
## 336 2 triumph tr7 coupe  
## 337 1 ford mustang cobra  
## 338 3 honda accord  
## 339 1 plymouth reliant  
## 340 1 buick skylark  
## 341 1 dodge aries wagon (sw)  
## 342 1 chevrolet citation  
## 343 1 plymouth reliant  
## 344 3 toyota starlet  
## 345 1 plymouth champ  
## 346 3 honda civic 1300  
## 347 3 subaru  
## 348 3 datsun 210 mpg  
## 349 3 toyota tercel  
## 350 3 mazda glc 4  
## 351 1 plymouth horizon 4  
## 352 1 ford escort 4w  
## 353 1 ford escort 2h  
## 354 2 volkswagen jetta  
## 355 2 renault 18i  
## 356 3 honda prelude  
## 357 3 toyota corolla  
## 358 3 datsun 200sx  
## 359 3 mazda 626  
## 360 2 peugeot 505s turbo diesel  
## 361 2 volvo diesel  
## 362 3 toyota cressida  
## 363 3 datsun 810 maxima  
## 364 1 buick century  
## 365 1 oldsmobile cutlass ls  
## 366 1 ford granada gl  
## 367 1 chrysler lebaron salon  
## 368 1 chevrolet cavalier  
## 369 1 chevrolet cavalier wagon  
## 370 1 chevrolet cavalier 2-door  
## 371 1 pontiac j2000 se hatchback  
## 372 1 dodge aries se  
## 373 1 pontiac phoenix  
## 374 1 ford fairmont futura  
## 375 1 amc concord dl  
## 376 2 volkswagen rabbit l  
## 377 3 mazda glc custom l  
## 378 3 mazda glc custom  
## 379 1 plymouth horizon miser  
## 380 1 mercury lynx l  
## 381 3 nissan stanza xe  
## 382 3 honda accord  
## 383 3 toyota corolla  
## 384 3 honda civic  
## 385 3 honda civic (auto)  
## 386 3 datsun 310 gx  
## 387 1 buick century limited  
## 388 1 oldsmobile cutlass ciera (diesel)  
## 389 1 chrysler lebaron medallion  
## 390 1 ford granada l  
## 391 3 toyota celica gt  
## 392 1 dodge charger 2.2  
## 393 1 chevrolet camaro  
## 394 1 ford mustang gl  
## 395 2 vw pickup  
## 396 1 dodge rampage  
## 397 1 ford ranger  
## 398 1 chevy s-10

#Regression Model  
  
model\_1<-lm(training$mpg~training$model.year,data= autompg)  
summary(model\_1)

##   
## Call:  
## lm(formula = training$mpg ~ training$model.year, data = autompg)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -9.565 -5.044 -1.174 4.921 18.895   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -42.8863 8.8543 -4.844 2.00e-06 \*\*\*  
## training$model.year 0.8601 0.1184 7.264 2.95e-12 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 6.205 on 316 degrees of freedom  
## Multiple R-squared: 0.1431, Adjusted R-squared: 0.1404   
## F-statistic: 52.77 on 1 and 316 DF, p-value: 2.949e-12

#Use model on test dataset  
  
B0 <-model\_1$coefficients[1]  
B0

## (Intercept)   
## -42.88627

B1<-model\_1$coefficients[2]  
B1

## training$model.year   
## 0.8601377

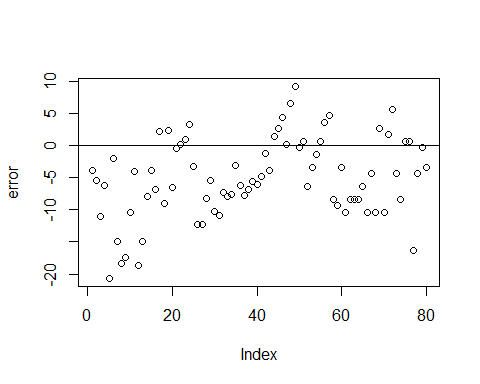
y\_predicted<-B0+(B1\*test$model.year)  
y\_predicted

## [1] 25.92475 25.92475 25.92475 25.92475 25.92475 25.92475 25.92475  
## [8] 25.92475 25.92475 25.92475 25.92475 25.92475 25.92475 25.92475  
## [15] 25.92475 25.92475 25.92475 25.92475 25.92475 25.92475 26.78489  
## [22] 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489  
## [29] 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489  
## [36] 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489  
## [43] 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489 26.78489  
## [50] 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503  
## [57] 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503  
## [64] 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503  
## [71] 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503 27.64503  
## [78] 27.64503 27.64503 27.64503

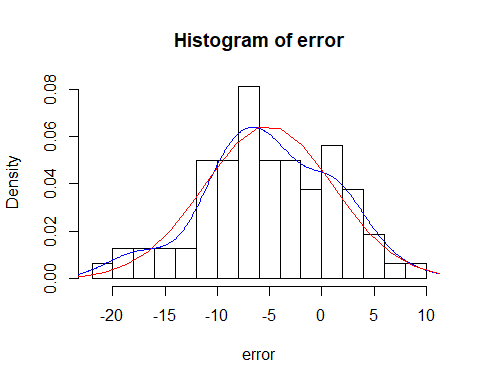
#Calculating Error  
  
error<-y\_predicted-test$mpg  
summary(error)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## -20.675 -8.355 -5.445 -5.083 -0.220 9.185

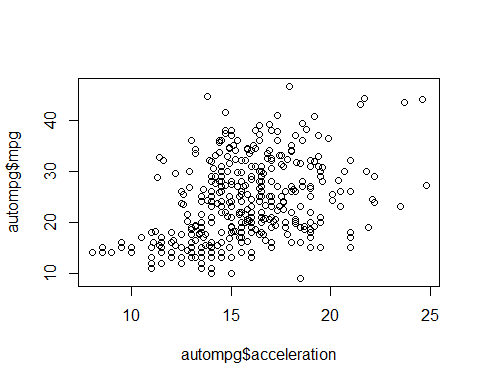
plot(error)  
abline(0,0)



#make a histogram  
hist(error,prob=T,breaks=20)  
#make a curve  
lines(density(error),col='blue')  
  
#Normal Curve  
mean\_error<-mean(error)  
variance\_error<-var(error)  
sd\_error<-sqrt(variance\_error)  
x\_error<-seq(-25,15,length=20)  
y\_error<-dnorm(x\_error,mean\_error,sd\_error)  
lines(x\_error,y\_error,col='red')



#Second model mpg and accelaration Check  
  
  
#Scatter Plot 4 between mpg and accelaration  
plot(autompg$acceleration,autompg$mpg)



#Calculate the correlation between mpg and acceleration  
cor(autompg$acceleration,autompg$mpg)

## [1] 0.4202889

model2<-lm(mpg~acceleration,data=autompg)  
summary(model2)

##   
## Call:  
## lm(formula = mpg ~ acceleration, data = autompg)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -18.007 -5.636 -1.242 4.758 23.192   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 4.9698 2.0432 2.432 0.0154 \*   
## acceleration 1.1912 0.1292 9.217 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 7.101 on 396 degrees of freedom  
## Multiple R-squared: 0.1766, Adjusted R-squared: 0.1746   
## F-statistic: 84.96 on 1 and 396 DF, p-value: < 2.2e-16

# Intercept   
B0<-model2$coefficients[1]  
B0

## (Intercept)   
## 4.969793

#slope  
  
B1<-model2$coefficients[2]  
B1

## acceleration   
## 1.191205

#Splitting the dataset into training and test  
  
training1 <- autompg[1:318,]  
training

## mpg cylinder displacement horsepower weight acceleration model.year  
## 1 18.0 8 307.0 17 3504 12.0 70  
## 2 15.0 8 350.0 35 3693 11.5 70  
## 3 18.0 8 318.0 29 3436 11.0 70  
## 4 16.0 8 304.0 29 3433 12.0 70  
## 5 17.0 8 302.0 24 3449 10.5 70  
## 6 15.0 8 429.0 42 4341 10.0 70  
## 7 14.0 8 454.0 47 4354 9.0 70  
## 8 14.0 8 440.0 46 4312 8.5 70  
## 9 14.0 8 455.0 48 4425 10.0 70  
## 10 15.0 8 390.0 40 3850 8.5 70  
## 11 15.0 8 383.0 37 3563 10.0 70  
## 12 14.0 8 340.0 34 3609 8.0 70  
## 13 15.0 8 400.0 29 3761 9.5 70  
## 14 14.0 8 455.0 48 3086 10.0 70  
## 15 24.0 4 113.0 91 2372 15.0 70  
## 16 22.0 6 198.0 91 2833 15.5 70  
## 17 18.0 6 199.0 93 2774 15.5 70  
## 18 21.0 6 200.0 81 2587 16.0 70  
## 19 27.0 4 97.0 84 2130 14.5 70  
## 20 26.0 4 97.0 50 1835 20.5 70  
## 21 25.0 4 110.0 83 2672 17.5 70  
## 22 24.0 4 107.0 86 2430 14.5 70  
## 23 25.0 4 104.0 91 2375 17.5 70  
## 24 26.0 4 121.0 10 2234 12.5 70  
## 25 21.0 6 199.0 86 2648 15.0 70  
## 26 10.0 8 360.0 46 4615 14.0 70  
## 27 10.0 8 307.0 43 4376 15.0 70  
## 28 11.0 8 318.0 45 4382 13.5 70  
## 29 9.0 8 304.0 41 4732 18.5 70  
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## 31 28.0 4 140.0 86 2264 15.5 71  
## 32 25.0 4 113.0 91 2228 14.0 71  
## 33 25.0 4 98.0 1 2046 19.0 71  
## 34 19.0 6 232.0 2 2634 13.0 71  
## 35 16.0 6 225.0 5 3439 15.5 71  
## 36 17.0 6 250.0 2 3329 15.5 71  
## 37 19.0 6 250.0 84 3302 15.5 71  
## 38 18.0 6 232.0 2 3288 15.5 71  
## 39 14.0 8 350.0 35 4209 12.0 71  
## 40 14.0 8 400.0 38 4464 11.5 71  
## 41 14.0 8 351.0 31 4154 13.5 71  
## 42 14.0 8 318.0 29 4096 13.0 71  
## 43 12.0 8 383.0 39 4955 11.5 71  
## 44 13.0 8 400.0 37 4746 12.0 71  
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## 46 18.0 6 258.0 8 2962 13.5 71  
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## 48 19.0 6 250.0 2 3282 15.0 71  
## 49 18.0 6 250.0 84 3139 14.5 71  
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## 51 28.0 4 116.0 86 2123 14.0 71  
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## 53 30.0 4 88.0 72 2065 14.5 71  
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## 55 35.0 4 72.0 66 1613 18.0 71  
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## 72 19.0 3 70.0 93 2330 13.5 72  
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## 80 26.0 4 96.0 66 2189 18.0 72  
## 81 22.0 4 122.0 82 2395 16.0 72  
## 82 28.0 4 97.0 88 2288 17.0 72  
## 83 23.0 4 120.0 93 2506 14.5 72  
## 84 28.0 4 98.0 76 2164 15.0 72  
## 85 27.0 4 97.0 84 2100 16.5 72  
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## 90 15.0 8 318.0 29 3777 12.5 73  
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## 94 14.0 8 318.0 29 4237 14.5 73  
## 95 13.0 8 440.0 46 4735 11.0 73  
## 96 12.0 8 455.0 48 4951 11.0 73  
## 97 13.0 8 360.0 38 3821 11.0 73  
## 98 18.0 6 225.0 5 3121 16.5 73  
## 99 16.0 6 250.0 2 3278 18.0 73  
## 100 18.0 6 232.0 2 2945 16.0 73  
## 101 18.0 6 250.0 84 3021 16.5 73  
## 102 23.0 6 198.0 91 2904 16.0 73  
## 103 26.0 4 97.0 50 1950 21.0 73  
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## 111 22.0 4 108.0 90 2379 16.5 73  
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## 113 19.0 4 122.0 81 2310 18.5 73  
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## 130 31.0 4 79.0 64 1950 19.0 74  
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## 133 25.0 4 140.0 71 2542 17.0 74  
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## 159 16.0 8 318.0 29 4498 14.5 75  
## 160 14.0 8 351.0 27 4657 13.5 75  
## 161 17.0 6 231.0 8 3907 21.0 75  
## 162 16.0 6 250.0 5 3897 18.5 75  
## 163 15.0 6 258.0 8 3730 19.0 75  
## 164 18.0 6 225.0 91 3785 19.0 75  
## 165 21.0 6 231.0 8 3039 15.0 75  
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## 167 13.0 8 302.0 16 3169 12.0 75  
## 168 29.0 4 97.0 71 2171 16.0 75  
## 169 23.0 4 140.0 79 2639 17.0 75  
## 170 20.0 6 232.0 2 2914 16.0 75  
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## 172 24.0 4 134.0 92 2702 13.5 75  
## 173 25.0 4 90.0 68 2223 16.5 75  
## 174 24.0 4 119.0 93 2545 17.0 75  
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## 180 22.0 4 121.0 94 2945 14.5 75  
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## 187 27.0 4 101.0 79 2202 15.3 76  
## 188 17.5 8 305.0 24 4215 13.0 76  
## 189 16.0 8 318.0 29 4190 13.0 76  
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## 196 29.0 4 85.0 53 2035 22.2 76  
## 197 24.5 4 98.0 57 2164 22.1 76  
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## 200 20.0 6 225.0 2 3651 17.7 76  
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## 206 28.0 4 97.0 71 2155 16.4 76  
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## 213 16.5 8 350.0 39 4380 12.1 76  
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## 246 36.1 4 98.0 63 1800 14.4 78  
## 247 32.8 4 78.0 53 1985 19.4 78  
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## 269 27.2 4 119.0 93 2300 14.7 78  
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## 272 23.2 4 156.0 5 2745 16.7 78  
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## 278 16.2 6 163.0 19 3410 15.8 78  
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## 285 20.6 6 225.0 8 3360 16.6 79  
## 286 17.0 8 305.0 17 3840 15.4 79  
## 287 17.6 8 302.0 16 3725 13.4 79  
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## 291 15.5 8 351.0 25 4054 14.3 79  
## 292 19.2 8 267.0 15 3605 15.0 79  
## 293 18.5 8 360.0 29 3940 13.0 79  
## 294 31.9 4 89.0 68 1925 14.0 79  
## 295 34.1 4 86.0 62 1975 15.2 79  
## 296 35.7 4 98.0 76 1915 14.4 79  
## 297 27.4 4 121.0 76 2670 15.0 79  
## 298 25.4 5 183.0 73 3530 20.1 79  
## 299 23.0 8 350.0 15 3900 17.4 79  
## 300 27.2 4 141.0 68 3190 24.8 79  
## 301 23.9 8 260.0 86 3420 22.2 79  
## 302 34.2 4 105.0 67 2200 13.2 79  
## 303 34.5 4 105.0 67 2150 14.9 79  
## 304 31.8 4 85.0 62 2020 19.2 79  
## 305 37.3 4 91.0 66 2130 14.7 79  
## 306 28.4 4 151.0 86 2670 16.0 79  
## 307 28.8 6 173.0 11 2595 11.3 79  
## 308 26.8 6 173.0 11 2700 12.9 79  
## 309 33.5 4 151.0 86 2556 13.2 79  
## 310 41.5 4 98.0 72 2144 14.7 80  
## 311 38.1 4 89.0 57 1968 18.8 80  
## 312 32.1 4 98.0 67 2120 15.5 80  
## 313 37.2 4 86.0 62 2019 16.4 80  
## 314 28.0 4 151.0 86 2678 16.5 80  
## 315 26.4 4 140.0 84 2870 18.1 80  
## 316 24.3 4 151.0 86 3003 20.1 80  
## 317 19.1 6 225.0 86 3381 18.7 80  
## 318 34.3 4 97.0 74 2188 15.8 80  
## origin car.name  
## 1 1 chevrolet chevelle malibu  
## 2 1 buick skylark 320  
## 3 1 plymouth satellite  
## 4 1 amc rebel sst  
## 5 1 ford torino  
## 6 1 ford galaxie 500  
## 7 1 chevrolet impala  
## 8 1 plymouth fury iii  
## 9 1 pontiac catalina  
## 10 1 amc ambassador dpl  
## 11 1 dodge challenger se  
## 12 1 plymouth 'cuda 340  
## 13 1 chevrolet monte carlo  
## 14 1 buick estate wagon (sw)  
## 15 3 toyota corona mark ii  
## 16 1 plymouth duster  
## 17 1 amc hornet  
## 18 1 ford maverick  
## 19 3 datsun pl510  
## 20 2 volkswagen 1131 deluxe sedan  
## 21 2 peugeot 504  
## 22 2 audi 100 ls  
## 23 2 saab 99e  
## 24 2 bmw 2002  
## 25 1 amc gremlin  
## 26 1 ford f250  
## 27 1 chevy c20  
## 28 1 dodge d200  
## 29 1 hi 1200d  
## 30 3 datsun pl510  
## 31 1 chevrolet vega 2300  
## 32 3 toyota corona  
## 33 1 ford pinto  
## 34 1 amc gremlin  
## 35 1 plymouth satellite custom  
## 36 1 chevrolet chevelle malibu  
## 37 1 ford torino 500  
## 38 1 amc matador  
## 39 1 chevrolet impala  
## 40 1 pontiac catalina brougham  
## 41 1 ford galaxie 500  
## 42 1 plymouth fury iii  
## 43 1 dodge monaco (sw)  
## 44 1 ford country squire (sw)  
## 45 1 pontiac safari (sw)  
## 46 1 amc hornet sportabout (sw)  
## 47 1 chevrolet vega (sw)  
## 48 1 pontiac firebird  
## 49 1 ford mustang  
## 50 1 mercury capri 2000  
## 51 2 opel 1900  
## 52 2 peugeot 304  
## 53 2 fiat 124b  
## 54 3 toyota corolla 1200  
## 55 3 datsun 1200  
## 56 2 volkswagen model 111  
## 57 1 plymouth cricket  
## 58 3 toyota corona hardtop  
## 59 1 dodge colt hardtop  
## 60 2 volkswagen type 3  
## 61 1 chevrolet vega  
## 62 1 ford pinto runabout  
## 63 1 chevrolet impala  
## 64 1 pontiac catalina  
## 65 1 plymouth fury iii  
## 66 1 ford galaxie 500  
## 67 1 amc ambassador sst  
## 68 1 mercury marquis  
## 69 1 buick lesabre custom  
## 70 1 oldsmobile delta 88 royale  
## 71 1 chrysler newport royal  
## 72 3 mazda rx2 coupe  
## 73 1 amc matador (sw)  
## 74 1 chevrolet chevelle concours (sw)  
## 75 1 ford gran torino (sw)  
## 76 1 plymouth satellite custom (sw)  
## 77 2 volvo 145e (sw)  
## 78 2 volkswagen 411 (sw)  
## 79 2 peugeot 504 (sw)  
## 80 2 renault 12 (sw)  
## 81 1 ford pinto (sw)  
## 82 3 datsun 510 (sw)  
## 83 3 toyouta corona mark ii (sw)  
## 84 1 dodge colt (sw)  
## 85 3 toyota corolla 1600 (sw)  
## 86 1 buick century 350  
## 87 1 amc matador  
## 88 1 chevrolet malibu  
## 89 1 ford gran torino  
## 90 1 dodge coronet custom  
## 91 1 mercury marquis brougham  
## 92 1 chevrolet caprice classic  
## 93 1 ford ltd  
## 94 1 plymouth fury gran sedan  
## 95 1 chrysler new yorker brougham  
## 96 1 buick electra 225 custom  
## 97 1 amc ambassador brougham  
## 98 1 plymouth valiant  
## 99 1 chevrolet nova custom  
## 100 1 amc hornet  
## 101 1 ford maverick  
## 102 1 plymouth duster  
## 103 2 volkswagen super beetle  
## 104 1 chevrolet impala  
## 105 1 ford country  
## 106 1 plymouth custom suburb  
## 107 1 oldsmobile vista cruiser  
## 108 1 amc gremlin  
## 109 3 toyota carina  
## 110 1 chevrolet vega  
## 111 3 datsun 610  
## 112 3 maxda rx3  
## 113 1 ford pinto  
## 114 1 mercury capri v6  
## 115 2 fiat 124 sport coupe  
## 116 1 chevrolet monte carlo s  
## 117 1 pontiac grand prix  
## 118 2 fiat 128  
## 119 2 opel manta  
## 120 2 audi 100ls  
## 121 2 volvo 144ea  
## 122 1 dodge dart custom  
## 123 2 saab 99le  
## 124 3 toyota mark ii  
## 125 1 oldsmobile omega  
## 126 1 plymouth duster  
## 127 1 ford maverick  
## 128 1 amc hornet  
## 129 1 chevrolet nova  
## 130 3 datsun b210  
## 131 1 ford pinto  
## 132 3 toyota corolla 1200  
## 133 1 chevrolet vega  
## 134 1 chevrolet chevelle malibu classic  
## 135 1 amc matador  
## 136 1 plymouth satellite sebring  
## 137 1 ford gran torino  
## 138 1 buick century luxus (sw)  
## 139 1 dodge coronet custom (sw)  
## 140 1 ford gran torino (sw)  
## 141 1 amc matador (sw)  
## 142 2 audi fox  
## 143 2 volkswagen dasher  
## 144 2 opel manta  
## 145 3 toyota corona  
## 146 3 datsun 710  
## 147 1 dodge colt  
## 148 2 fiat 128  
## 149 2 fiat 124 tc  
## 150 3 honda civic  
## 151 3 subaru  
## 152 2 fiat x1.9  
## 153 1 plymouth valiant custom  
## 154 1 chevrolet nova  
## 155 1 mercury monarch  
## 156 1 ford maverick  
## 157 1 pontiac catalina  
## 158 1 chevrolet bel air  
## 159 1 plymouth grand fury  
## 160 1 ford ltd  
## 161 1 buick century  
## 162 1 chevroelt chevelle malibu  
## 163 1 amc matador  
## 164 1 plymouth fury  
## 165 1 buick skyhawk  
## 166 1 chevrolet monza 2+2  
## 167 1 ford mustang ii  
## 168 3 toyota corolla  
## 169 1 ford pinto  
## 170 1 amc gremlin  
## 171 1 pontiac astro  
## 172 3 toyota corona  
## 173 2 volkswagen dasher  
## 174 3 datsun 710  
## 175 1 ford pinto  
## 176 2 volkswagen rabbit  
## 177 1 amc pacer  
## 178 2 audi 100ls  
## 179 2 peugeot 504  
## 180 2 volvo 244dl  
## 181 2 saab 99le  
## 182 3 honda civic cvcc  
## 183 2 fiat 131  
## 184 2 opel 1900  
## 185 1 capri ii  
## 186 1 dodge colt  
## 187 2 renault 12tl  
## 188 1 chevrolet chevelle malibu classic  
## 189 1 dodge coronet brougham  
## 190 1 amc matador  
## 191 1 ford gran torino  
## 192 1 plymouth valiant  
## 193 1 chevrolet nova  
## 194 1 ford maverick  
## 195 1 amc hornet  
## 196 1 chevrolet chevette  
## 197 1 chevrolet woody  
## 198 2 vw rabbit  
## 199 3 honda civic  
## 200 1 dodge aspen se  
## 201 1 ford granada ghia  
## 202 1 pontiac ventura sj  
## 203 1 amc pacer d/l  
## 204 2 volkswagen rabbit  
## 205 3 datsun b-210  
## 206 3 toyota corolla  
## 207 1 ford pinto  
## 208 2 volvo 245  
## 209 1 plymouth volare premier v8  
## 210 2 peugeot 504  
## 211 3 toyota mark ii  
## 212 2 mercedes-benz 280s  
## 213 1 cadillac seville  
## 214 1 chevy c10  
## 215 1 ford f108  
## 216 1 dodge d100  
## 217 3 honda accord cvcc  
## 218 1 buick opel isuzu deluxe  
## 219 2 renault 5 gtl  
## 220 1 plymouth arrow gs  
## 221 3 datsun f-10 hatchback  
## 222 1 chevrolet caprice classic  
## 223 1 oldsmobile cutlass supreme  
## 224 1 dodge monaco brougham  
## 225 1 mercury cougar brougham  
## 226 1 chevrolet concours  
## 227 1 buick skylark  
## 228 1 plymouth volare custom  
## 229 1 ford granada  
## 230 1 pontiac grand prix lj  
## 231 1 chevrolet monte carlo landau  
## 232 1 chrysler cordoba  
## 233 1 ford thunderbird  
## 234 2 volkswagen rabbit custom  
## 235 1 pontiac sunbird coupe  
## 236 3 toyota corolla liftback  
## 237 1 ford mustang ii 2+2  
## 238 1 chevrolet chevette  
## 239 1 dodge colt m/m  
## 240 3 subaru dl  
## 241 2 volkswagen dasher  
## 242 3 datsun 810  
## 243 2 bmw 320i  
## 244 3 mazda rx-4  
## 245 2 volkswagen rabbit custom diesel  
## 246 1 ford fiesta  
## 247 3 mazda glc deluxe  
## 248 3 datsun b210 gx  
## 249 3 honda civic cvcc  
## 250 1 oldsmobile cutlass salon brougham  
## 251 1 dodge diplomat  
## 252 1 mercury monarch ghia  
## 253 1 pontiac phoenix lj  
## 254 1 chevrolet malibu  
## 255 1 ford fairmont (auto)  
## 256 1 ford fairmont (man)  
## 257 1 plymouth volare  
## 258 1 amc concord  
## 259 1 buick century special  
## 260 1 mercury zephyr  
## 261 1 dodge aspen  
## 262 1 amc concord d/l  
## 263 1 chevrolet monte carlo landau  
## 264 1 buick regal sport coupe (turbo)  
## 265 1 ford futura  
## 266 1 dodge magnum xe  
## 267 1 chevrolet chevette  
## 268 3 toyota corona  
## 269 3 datsun 510  
## 270 1 dodge omni  
## 271 3 toyota celica gt liftback  
## 272 1 plymouth sapporo  
## 273 1 oldsmobile starfire sx  
## 274 3 datsun 200-sx  
## 275 2 audi 5000  
## 276 2 volvo 264gl  
## 277 2 saab 99gle  
## 278 2 peugeot 604sl  
## 279 2 volkswagen scirocco  
## 280 3 honda accord lx  
## 281 1 pontiac lemans v6  
## 282 1 mercury zephyr 6  
## 283 1 ford fairmont 4  
## 284 1 amc concord dl 6  
## 285 1 dodge aspen 6  
## 286 1 chevrolet caprice classic  
## 287 1 ford ltd landau  
## 288 1 mercury grand marquis  
## 289 1 dodge st. regis  
## 290 1 buick estate wagon (sw)  
## 291 1 ford country squire (sw)  
## 292 1 chevrolet malibu classic (sw)  
## 293 1 chrysler lebaron town @ country (sw)  
## 294 2 vw rabbit custom  
## 295 3 maxda glc deluxe  
## 296 1 dodge colt hatchback custom  
## 297 1 amc spirit dl  
## 298 2 mercedes benz 300d  
## 299 1 cadillac eldorado  
## 300 2 peugeot 504  
## 301 1 oldsmobile cutlass salon brougham  
## 302 1 plymouth horizon  
## 303 1 plymouth horizon tc3  
## 304 3 datsun 210  
## 305 2 fiat strada custom  
## 306 1 buick skylark limited  
## 307 1 chevrolet citation  
## 308 1 oldsmobile omega brougham  
## 309 1 pontiac phoenix  
## 310 2 vw rabbit  
## 311 3 toyota corolla tercel  
## 312 1 chevrolet chevette  
## 313 3 datsun 310  
## 314 1 chevrolet citation  
## 315 1 ford fairmont  
## 316 1 amc concord  
## 317 1 dodge aspen  
## 318 2 audi 4000

test1<- autompg[319:398,]  
test

## mpg cylinder displacement horsepower weight acceleration model.year  
## 319 29.8 4 134 86 2711 15.5 80  
## 320 31.3 4 120 71 2542 17.5 80  
## 321 37.0 4 119 88 2434 15.0 80  
## 322 32.2 4 108 71 2265 15.2 80  
## 323 46.6 4 86 62 2110 17.9 80  
## 324 27.9 4 156 5 2800 14.4 80  
## 325 40.8 4 85 62 2110 19.2 80  
## 326 44.3 4 90 51 2085 21.7 80  
## 327 43.4 4 90 51 2335 23.7 80  
## 328 36.4 5 121 64 2950 19.9 80  
## 329 30.0 4 146 64 3250 21.8 80  
## 330 44.6 4 91 64 1850 13.8 80  
## 331 40.9 4 85 1 1835 17.3 80  
## 332 33.8 4 97 64 2145 18.0 80  
## 333 29.8 4 89 59 1845 15.3 80  
## 334 32.7 6 168 18 2910 11.4 80  
## 335 23.7 3 70 2 2420 12.5 80  
## 336 35.0 4 122 84 2500 15.1 80  
## 337 23.6 4 140 1 2905 14.3 80  
## 338 32.4 4 107 69 2290 17.0 80  
## 339 27.2 4 135 80 2490 15.7 81  
## 340 26.6 4 151 80 2635 16.4 81  
## 341 25.8 4 156 88 2620 14.4 81  
## 342 23.5 6 173 8 2725 12.6 81  
## 343 30.0 4 135 80 2385 12.9 81  
## 344 39.1 4 79 56 1755 16.9 81  
## 345 39.0 4 86 61 1875 16.4 81  
## 346 35.1 4 81 57 1760 16.1 81  
## 347 32.3 4 97 64 2065 17.8 81  
## 348 37.0 4 85 62 1975 19.4 81  
## 349 37.7 4 89 59 2050 17.3 81  
## 350 34.1 4 91 65 1985 16.0 81  
## 351 34.7 4 105 60 2215 14.9 81  
## 352 34.4 4 98 62 2045 16.2 81  
## 353 29.9 4 98 62 2380 20.7 81  
## 354 33.0 4 105 70 2190 14.2 81  
## 355 34.5 4 100 1 2320 15.8 81  
## 356 33.7 4 107 71 2210 14.4 81  
## 357 32.4 4 108 71 2350 16.8 81  
## 358 32.9 4 119 2 2615 14.8 81  
## 359 31.6 4 120 70 2635 18.3 81  
## 360 28.1 4 141 76 3230 20.4 81  
## 361 30.7 6 145 72 3160 19.6 81  
## 362 25.4 6 168 12 2900 12.6 81  
## 363 24.2 6 146 13 2930 13.8 81  
## 364 22.4 6 231 8 3415 15.8 81  
## 365 26.6 8 350 5 3725 19.0 81  
## 366 20.2 6 200 84 3060 17.1 81  
## 367 17.6 6 225 81 3465 16.6 81  
## 368 28.0 4 112 84 2605 19.6 82  
## 369 27.0 4 112 84 2640 18.6 82  
## 370 34.0 4 112 84 2395 18.0 82  
## 371 31.0 4 112 81 2575 16.2 82  
## 372 29.0 4 135 80 2525 16.0 82  
## 373 27.0 4 151 86 2735 18.0 82  
## 374 24.0 4 140 88 2865 16.4 82  
## 375 23.0 4 151 1 3035 20.5 82  
## 376 36.0 4 105 70 1980 15.3 82  
## 377 37.0 4 91 65 2025 18.2 82  
## 378 31.0 4 91 65 1970 17.6 82  
## 379 38.0 4 105 60 2125 14.7 82  
## 380 36.0 4 98 67 2125 17.3 82  
## 381 36.0 4 120 84 2160 14.5 82  
## 382 36.0 4 107 71 2205 14.5 82  
## 383 34.0 4 108 67 2245 16.9 82  
## 384 38.0 4 91 64 1965 15.0 82  
## 385 32.0 4 91 64 1965 15.7 82  
## 386 38.0 4 91 64 1995 16.2 82  
## 387 25.0 6 181 8 2945 16.4 82  
## 388 38.0 6 262 81 3015 17.0 82  
## 389 26.0 4 156 88 2585 14.5 82  
## 390 22.0 6 232 9 2835 14.7 82  
## 391 32.0 4 144 92 2665 13.9 82  
## 392 36.0 4 135 80 2370 13.0 82  
## 393 27.0 4 151 86 2950 17.3 82  
## 394 27.0 4 140 82 2790 15.6 82  
## 395 44.0 4 97 53 2130 24.6 82  
## 396 32.0 4 135 80 2295 11.6 82  
## 397 28.0 4 120 75 2625 18.6 82  
## 398 31.0 4 119 78 2720 19.4 82  
## origin car.name  
## 319 3 toyota corona liftback  
## 320 3 mazda 626  
## 321 3 datsun 510 hatchback  
## 322 3 toyota corolla  
## 323 3 mazda glc  
## 324 1 dodge colt  
## 325 3 datsun 210  
## 326 2 vw rabbit c (diesel)  
## 327 2 vw dasher (diesel)  
## 328 2 audi 5000s (diesel)  
## 329 2 mercedes-benz 240d  
## 330 3 honda civic 1500 gl  
## 331 2 renault lecar deluxe  
## 332 3 subaru dl  
## 333 2 vokswagen rabbit  
## 334 3 datsun 280-zx  
## 335 3 mazda rx-7 gs  
## 336 2 triumph tr7 coupe  
## 337 1 ford mustang cobra  
## 338 3 honda accord  
## 339 1 plymouth reliant  
## 340 1 buick skylark  
## 341 1 dodge aries wagon (sw)  
## 342 1 chevrolet citation  
## 343 1 plymouth reliant  
## 344 3 toyota starlet  
## 345 1 plymouth champ  
## 346 3 honda civic 1300  
## 347 3 subaru  
## 348 3 datsun 210 mpg  
## 349 3 toyota tercel  
## 350 3 mazda glc 4  
## 351 1 plymouth horizon 4  
## 352 1 ford escort 4w  
## 353 1 ford escort 2h  
## 354 2 volkswagen jetta  
## 355 2 renault 18i  
## 356 3 honda prelude  
## 357 3 toyota corolla  
## 358 3 datsun 200sx  
## 359 3 mazda 626  
## 360 2 peugeot 505s turbo diesel  
## 361 2 volvo diesel  
## 362 3 toyota cressida  
## 363 3 datsun 810 maxima  
## 364 1 buick century  
## 365 1 oldsmobile cutlass ls  
## 366 1 ford granada gl  
## 367 1 chrysler lebaron salon  
## 368 1 chevrolet cavalier  
## 369 1 chevrolet cavalier wagon  
## 370 1 chevrolet cavalier 2-door  
## 371 1 pontiac j2000 se hatchback  
## 372 1 dodge aries se  
## 373 1 pontiac phoenix  
## 374 1 ford fairmont futura  
## 375 1 amc concord dl  
## 376 2 volkswagen rabbit l  
## 377 3 mazda glc custom l  
## 378 3 mazda glc custom  
## 379 1 plymouth horizon miser  
## 380 1 mercury lynx l  
## 381 3 nissan stanza xe  
## 382 3 honda accord  
## 383 3 toyota corolla  
## 384 3 honda civic  
## 385 3 honda civic (auto)  
## 386 3 datsun 310 gx  
## 387 1 buick century limited  
## 388 1 oldsmobile cutlass ciera (diesel)  
## 389 1 chrysler lebaron medallion  
## 390 1 ford granada l  
## 391 3 toyota celica gt  
## 392 1 dodge charger 2.2  
## 393 1 chevrolet camaro  
## 394 1 ford mustang gl  
## 395 2 vw pickup  
## 396 1 dodge rampage  
## 397 1 ford ranger  
## 398 1 chevy s-10

#Regression Model  
  
model2\_1<-lm(training$mpg~training$acceleration,data= autompg)  
summary(model2\_1)

##   
## Call:  
## lm(formula = training$mpg ~ training$acceleration, data = autompg)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -15.634 -4.528 -1.148 3.630 20.747   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 5.7368 1.9325 2.969 0.00322 \*\*   
## training$acceleration 1.0215 0.1242 8.226 5.12e-15 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 6.083 on 316 degrees of freedom  
## Multiple R-squared: 0.1764, Adjusted R-squared: 0.1737   
## F-statistic: 67.66 on 1 and 316 DF, p-value: 5.123e-15

#Use model on test dataset  
  
B0 <-model2\_1$coefficients[1]  
B0

## (Intercept)   
## 5.736814

B1<-model2\_1$coefficients[2]  
B1

## training$acceleration   
## 1.021494

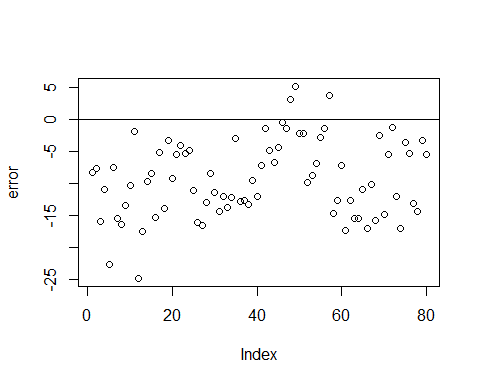
y\_predicted<-B0+(B1\*test$acceleration)  
y\_predicted

## [1] 21.56996 23.61295 21.05922 21.26352 24.02155 20.44632 25.34949  
## [8] 27.90323 29.94621 26.06454 28.00537 19.83343 23.40865 24.12370  
## [15] 21.36567 17.38184 18.50548 21.16137 20.34417 23.10221 21.77426  
## [22] 22.48931 20.44632 18.60763 18.91408 23.00006 22.48931 22.18286  
## [29] 23.91940 25.55379 23.40865 22.08071 20.95707 22.28501 26.88173  
## [36] 20.24202 21.87641 20.44632 22.89791 20.85492 24.43015 26.57528  
## [43] 25.75809 18.60763 19.83343 21.87641 25.14519 23.20435 22.69361  
## [50] 25.75809 24.73659 24.12370 22.28501 22.08071 24.12370 22.48931  
## [57] 26.67743 21.36567 24.32800 23.71510 20.75277 23.40865 20.54847  
## [64] 20.54847 23.00006 21.05922 21.77426 22.28501 22.48931 23.10221  
## [71] 20.54847 20.75277 19.93557 19.01623 23.40865 21.67211 30.86556  
## [78] 17.58614 24.73659 25.55379

#Calculating Error  
  
error<-y\_predicted-test$mpg  
summary(error)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## -24.767 -13.767 -9.776 -9.328 -4.930 5.094

plot(error)  
abline(0,0)



#make a histogram  
hist(error,prob=T,breaks=20)  
#make a curve  
lines(density(error),col='blue')  
  
#Normal Curve  
mean\_error<-mean(error)  
variance\_error<-var(error)  
sd\_error<-sqrt(variance\_error)  
x\_error<-seq(-25,15,length=20)  
y\_error<-dnorm(x\_error,mean\_error,sd\_error)  
lines(x\_error,y\_error,col='red')

