

Multi Linear Regression

Problem statement 1

Prepare a prediction model for profit of 50_startups data. Do transformations for getting better predictions of profit and make a table containing R^2 value for each prepared model.

Answer:

Rcode:

```
startups <- read.csv(file.choose())
```

```
summary(startups)
```

```
attach(startups)
```

```
View(startups)
```

```
class(startups)
```

```
names(startups)
```

```
sd(R.D.Spend)
```

```
sd(Administration)
```

```
sd(Marketing.Spend)
```

```
sd(Profit)
```

```
var(startups)
```

```
library(moments)
```

```
skewness(R.D.Spend)
```

```
skewness(Administration)
```

```
skewness(Marketing.Spend)
```

```
skewness(Profit)
```

```
kurtosis(R.D.Spend)
```

```
kurtosis(Administration)
```

```
kurtosis(Marketing.Spend)
```

```
kurtosis(Profit)
```

```
qqnorm(R.D.Spend)
qqnorm(Administration)
qqnorm(Marketing.Spend)
qqnorm(Profit)
hist(R.D.Spend)
hist(Administration)
hist(Marketing.Spend)
hist(Profit)
boxplot(startups)
barplot(R.D.Spend,Profit)
barplot(Administration,Profit)
barplot(Marketing.Spend,Profit)
stem(Administration)
```

```
library(plyr)
State <- revalue(State,c("New York"="0", "California"="1", "Florida"="2"))
attach(startups)

startups <-
cbind(RD_Spend=R.D.Spend,Administration,Marketing_Spend=Marketing.Spend,
State,Profit)

startups <- as.data.frame(startups)
attach(startups)
View(startups)
plot(RD_Spend,Profit)
plot(Administration,Profit)
plot(Marketing_Spend,Profit)
```

```
plot(State,Profit)
```

```
pairs(startups) #Find the correlation between Output (Profit) & inputs (R.D Spend,  
Administration, Marketing, State) - SCATTER DIAGRAM
```

```
cor(startups)
```

```
startups_model <- lm(Profit~RD_Spend+Administration+Marketing_Spend+State)
```

```
summary(startups_model)
```

```
confint(startups_model,level = 0.95)
```

```
predict(startups_model,interval="predict")
```

```
startups_model1 <-
```

```
lm(Profit~RD_Spend+log(Administration)+Marketing_Spend+State)
```

```
summary(startups_model1)
```

```
confint(startups_model1,level = 0.95)
```

```
predict(startups_model1,interval="predict")
```

```
startups_model2 <- lm(Profit~RD_Spend+log(Administration))
```

```
summary(startups_model2)
```

```
confint(startups_model2,level = 0.95)
```

```
predict(startups_model2,interval="predict")
```

```
library(mvinfluence)
```

```
influence.measures(startups_model)
```

```
influenceIndexPlot(startups_model,id.n =3 )
```

```
influencePlot(startups_model,id.n=3)
```

```
## Regression after deleting the 49th and 50th observation, which is influential  
observation
```

Logarithmic Transformation

```
startups_model3<-  
lm(Profit~RD_Spend+log(Administration)+Marketing_Spend+log(State),data=startups[-c(49,50),])  
  
summary(startups_model3)  
  
confint(startups_model3,level = 0.95)  
  
predict(startups_model3,interval = "predict")
```

```
startups_model4<-  
lm(Profit~RD_Spend+Administration+Marketing_Spend+State,data=startups[-c(49,50),])  
  
summary(startups_model4)  
  
confint(startups_model4,level = 0.95)  
  
predict(startups_model4,interval="predict")
```

```
startups_model_exp<-  
lm(log(Profit)~RD_Spend+Administration+Marketing_Spend+State,data=startups[-c(49,50),])  
  
summary(startups_model_exp)  
  
confint(startups_model_exp,level = 0.95)  
  
predict(startups_model_exp,interval="predict")
```

```
startups_model_exp1<-  
lm(log(Profit)~RD_Spend+Marketing_Spend+State,data=startups[-c(49,50),])  
  
summary(startups_model_exp1)  
  
confint(startups_model_exp1,level = 0.95)  
  
predict(startups_model_exp1,interval="predict")  
  
plot(startups_model_exp1)
```

```

startups_model_quad<-
lm(Profit~RD_Spend+I(RD_Spend^2)+Administration+I(Administration^2)+Marketing_Spend+I(Marketing_Spend^2)+State+I(State),data=startups[-c(49,50),])
summary(startups_model_quad)
confint(startups_model_quad,level = 0.95)
predict(startups_model_quad,interval = "predict")

```

```

startups_model_quad1<-
lm(Profit~RD_Spend+I(RD_Spend^2)+Administration+I(Administration^2),data=startups[-c(49,50),])
summary(startups_model_quad1)
confint(startups_model_quad1,level = 0.95)
predict(startups_model_quad1,interval = "predict")

```

```

startups_model_poly <- lm(Profit~RD_Spend+I(RD_Spend^2)+I(RD_Spend^3)+
Administration+I(Administration^2)+I(Administration^3)+
Marketing_Spend+I(Marketing_Spend^2)+I(Marketing_Spend^3)+
State+I(State^2)+I(State^3),data=startups[-c(49,50),])
summary(startups_model_poly)
confint(startups_model_poly,level = 0.95)
predict(startups_model_poly,interval="predict")

```

```

startups_model_poly1<- lm(Profit~RD_Spend+I(RD_Spend^2)+I(RD_Spend^3)+
Administration+I(Administration^2)+I(Administration^3),data=startups[-c(49,50),])
summary(startups_model_poly1)

```

```

confint(startups_model_poly1,level = 0.95)

predict(startups_model_poly1,interval="predict")

vif(startups_model1)

avPlots(startups_model1,id.n=2,id.cex=3)

```

Console:

```

> startups <- read.csv(file.choose())
> summary(startups)
      R.D.Spend      Administration      Marketing.Spend      State
Min.   : 0      Min.   : 51283      Min.   : 0      California:17
1st Qu.: 39936    1st Qu.:103731    1st Qu.:129300    Florida   :16
Median : 73051    Median :122700    Median :212716    New York  :17
Mean   : 73722    Mean   :121345    Mean   :211025
3rd Qu.:101603    3rd Qu.:144842    3rd Qu.:299469
Max.   :165349    Max.   :182646    Max.   :471784
      Profit
Min.   : 14681
1st Qu.: 90139
Median :107978
Mean   :112013
3rd Qu.:139766
Max.   :192262
> attach(startups)
> View(startups)

```

	R.D.Spend	Administration	Marketing.Spend	State	Profit
1	165349.20	136897.80	471784.10	New York	192261.83
2	162597.70	151377.59	443898.53	California	191792.06
3	153441.51	101145.55	407934.54	Florida	191050.39
4	144372.41	118671.85	383199.62	New York	182901.99
5	142107.34	91391.77	366168.42	Florida	166187.94
6	131876.90	99814.71	362861.36	New York	156991.12
7	134615.46	147198.87	127716.82	California	156122.51
8	130298.13	145530.06	323876.68	Florida	155752.60
9	120542.52	148718.95	311613.29	New York	152211.77
10	123334.88	108679.17	304981.62	California	149759.96
11	101913.08	110594.11	229160.95	Florida	146121.95
12	100671.96	91790.61	249744.55	California	144259.40
13	93863.75	127320.38	249839.44	Florida	141585.52
14	91992.39	135495.07	252664.93	California	134307.35

Showing 1 to 15 of 50 entries, 5 total columns

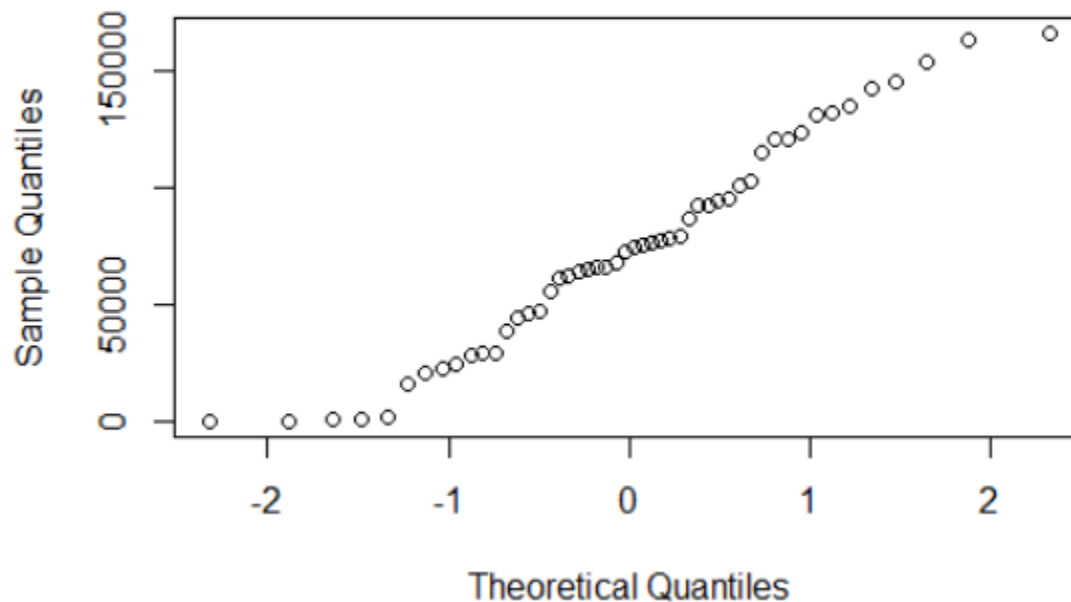
```
> class(startups)
```

```

[1] "data.frame"
> names(startups)
[1] "R.D.Spend"      "Administration" "Marketing.Spend" "State"
[5] "Profit"
> sd(R.D.Spend)
[1] 45902.26
> sd(Administration)
[1] 28017.8
> sd(Marketing.Spend)
[1] 122290.3
> sd(Profit)
[1] 40306.18
> var(startups)
      R.D.Spend Administration Marketing.Spend State      Profit
R.D.Spend    2107017150      311173891      4065495345    NA 1800006570
Administration 311173891      784997271      -110169009    NA 226667336
Marketing.Spend 4065495345     -110169009     14954920097    NA 3685778607
State           NA           NA           NA           NA    NA
Profit         1800006570     226667336      3685778607    NA 1624588173
> library(moments)
> skewness(R.D.Spend)
[1] 0.1590405
> skewness(Administration)
[1] -0.4742301
> skewness(Marketing.Spend)
[1] -0.04506632
> skewness(Profit)
[1] 0.02258638
> kurtosis(R.D.Spend)
[1] 2.194932
> kurtosis(Administration)
[1] 3.085538
> kurtosis(Marketing.Spend)
[1] 2.275967
> kurtosis(Profit)
[1] 2.824704
> qqnorm(R.D.Spend)

```

Normal Q-Q Plot

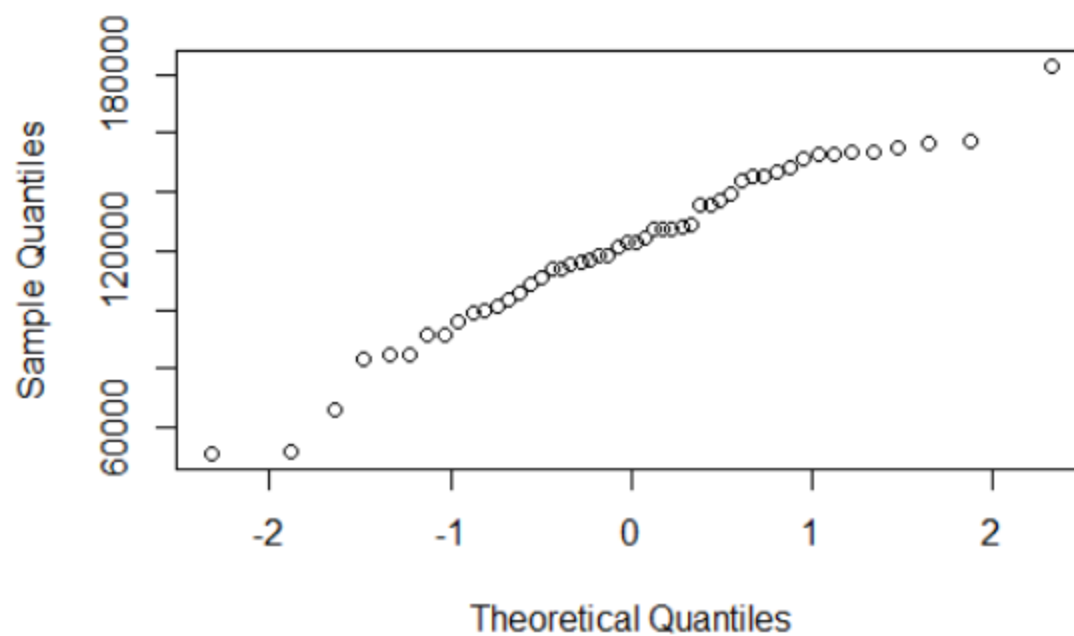


```

> qqnorm(Administration)

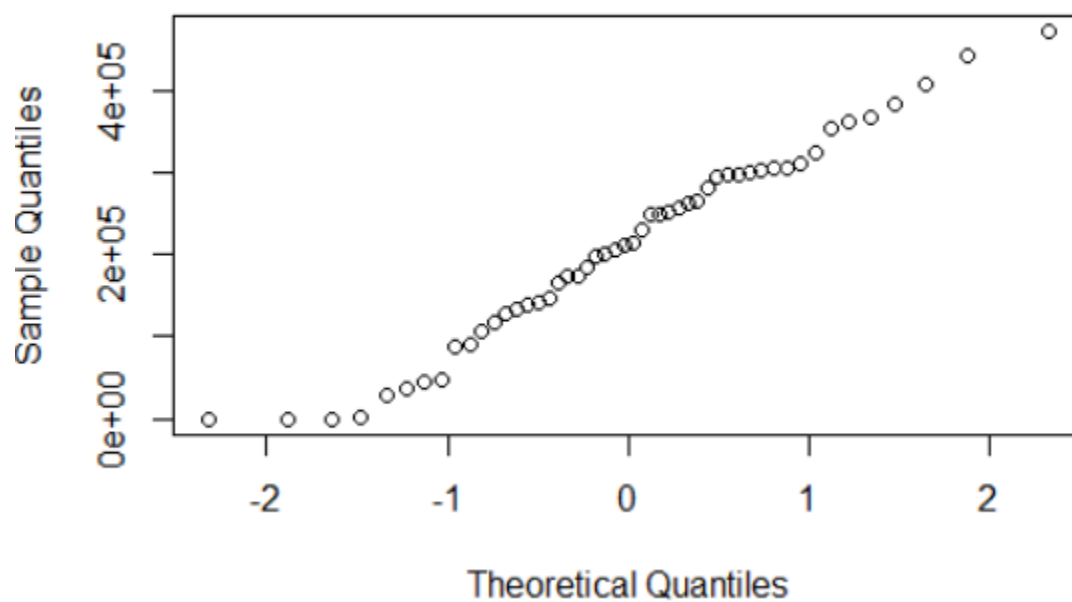
```

Normal Q-Q Plot



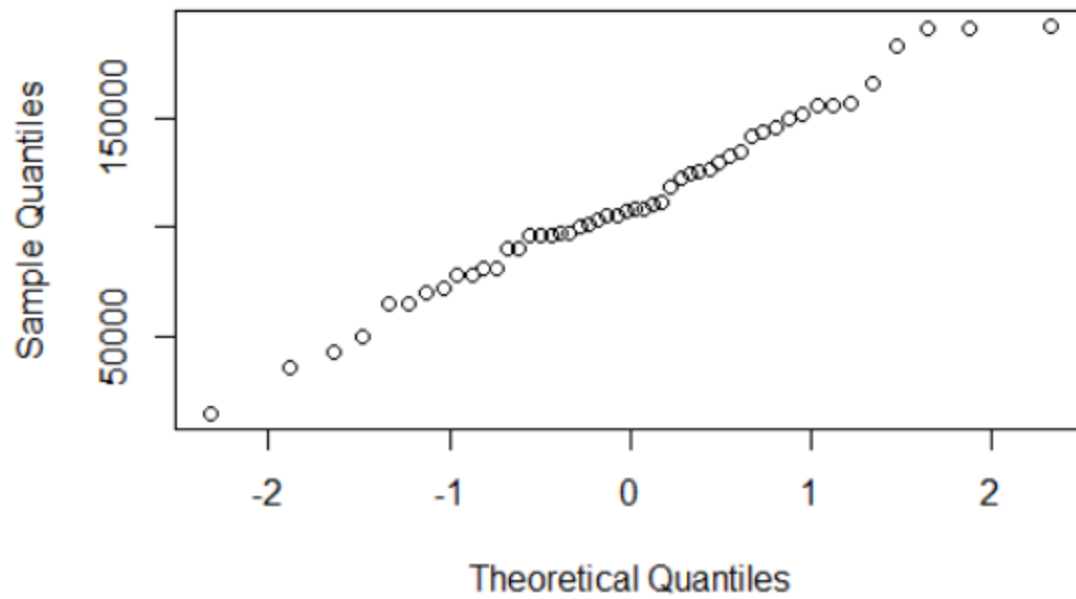
```
> qqnorm(Marketing.Spend)
```

Normal Q-Q Plot



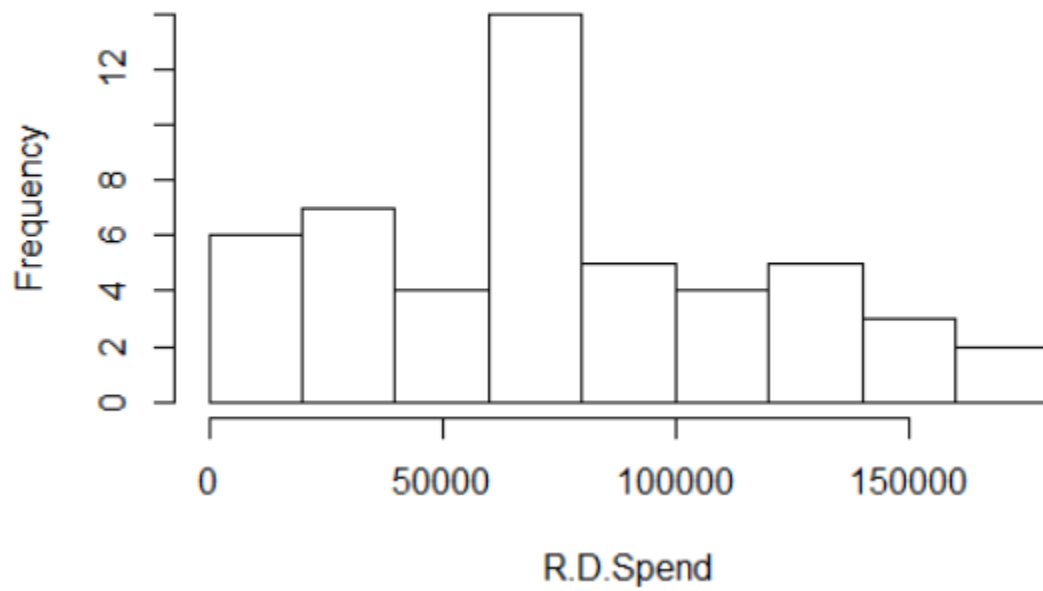
```
> qqnorm(Profit)
```


Normal Q-Q Plot



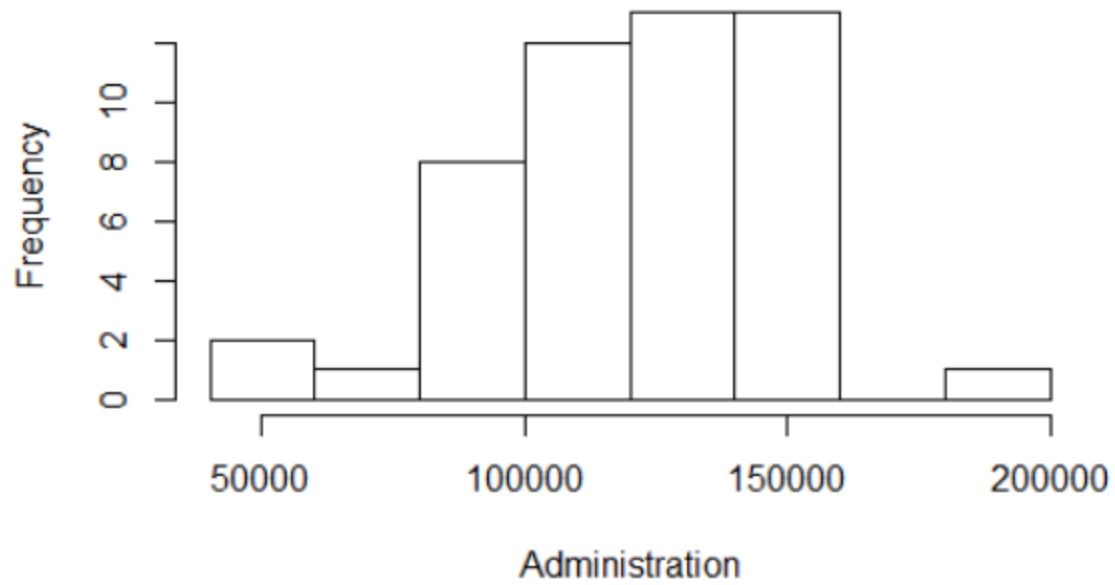
```
> hist(R.D.Spend)
```

Histogram of R.D.Spend



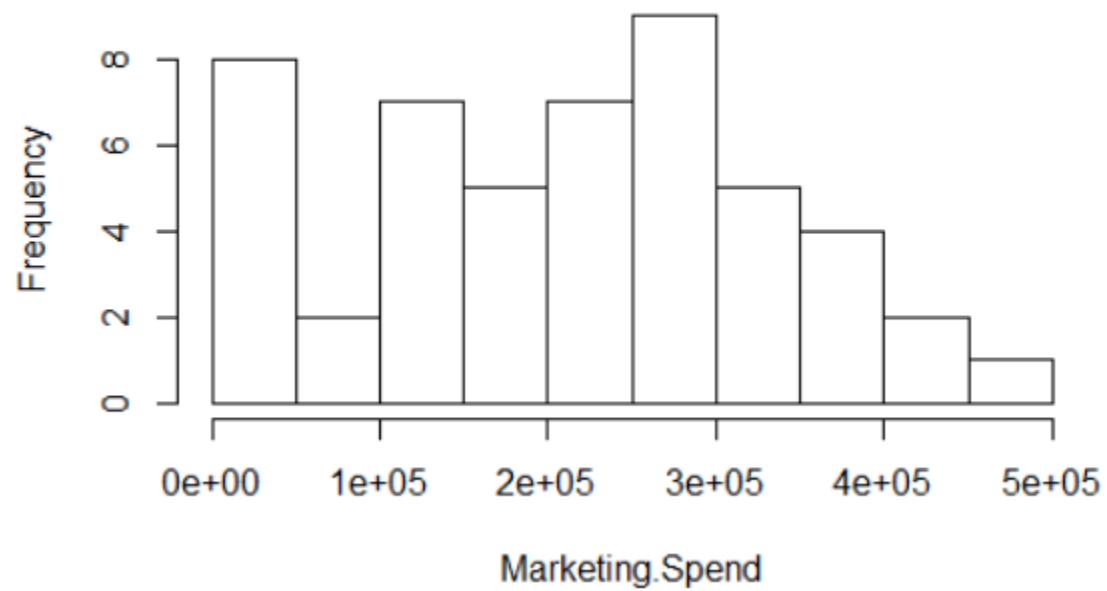
```
> hist(Administration)
```

Histogram of Administration

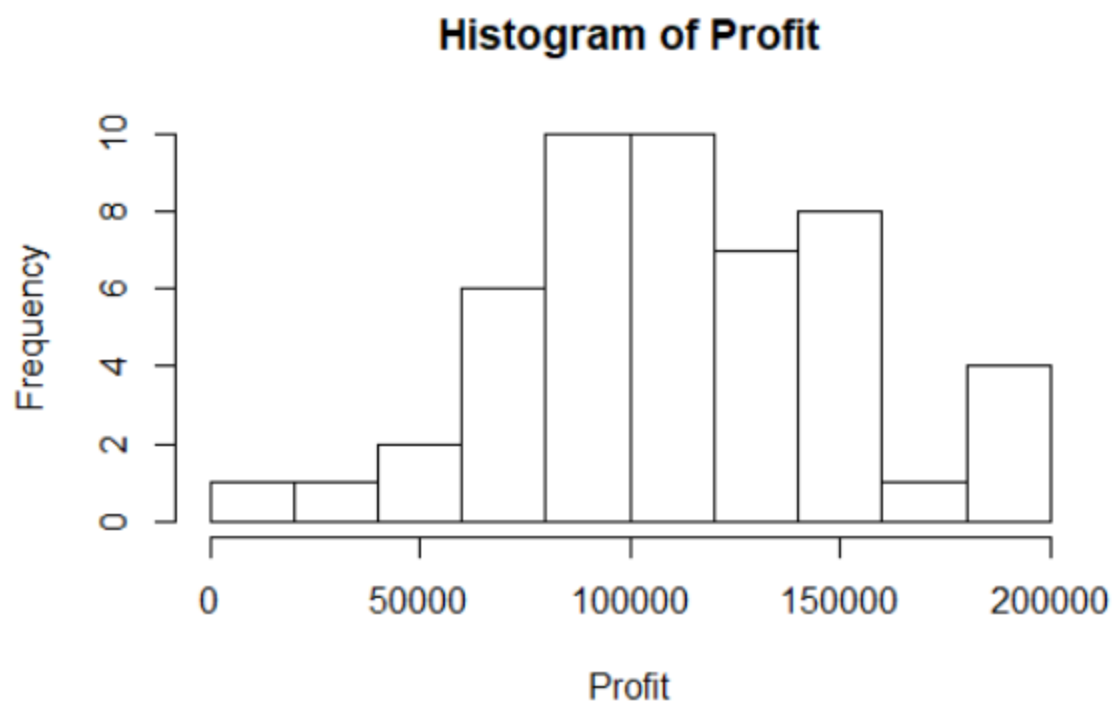


```
> hist(Marketing.Spend)
```

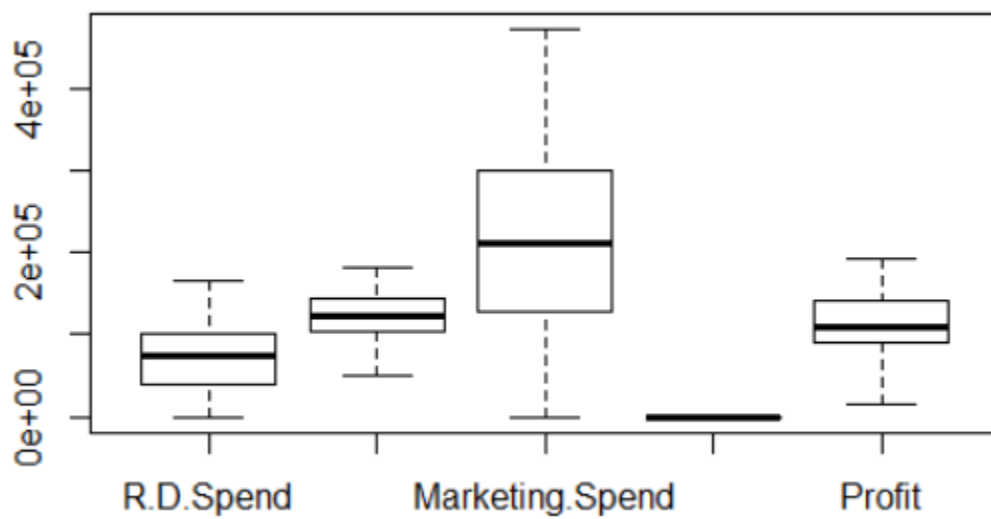
Histogram of Marketing.Spend



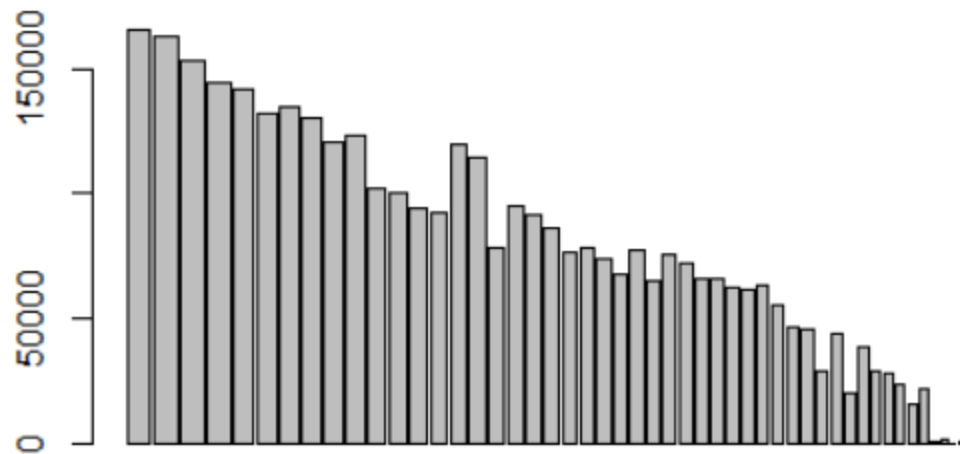
```
> hist(Profit)
```



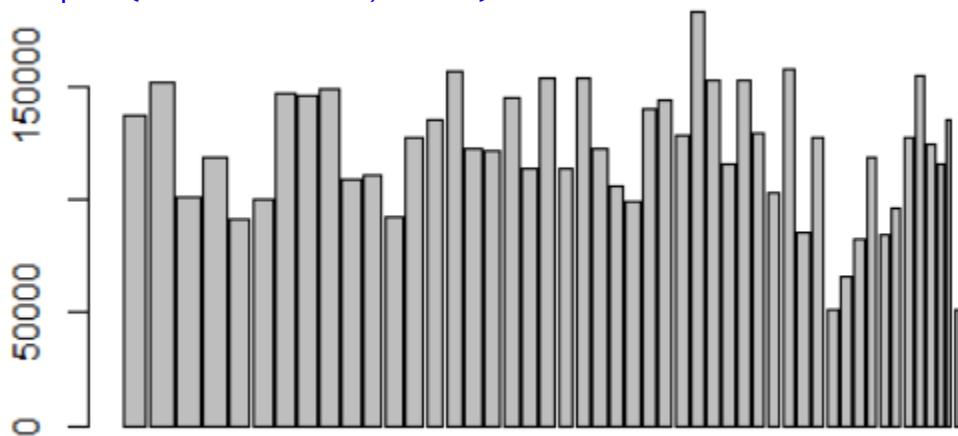
```
> boxplot(startups)
```



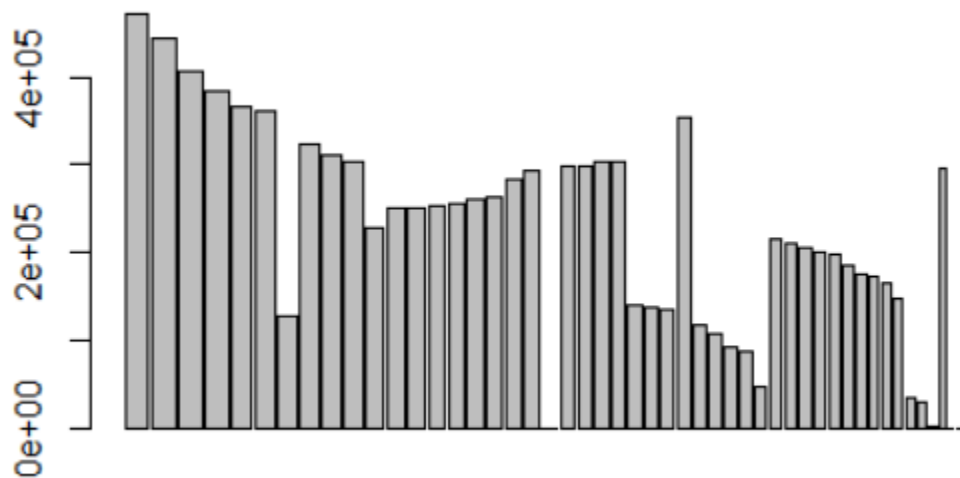
```
> barplot(R.D.Spend, Profit)
```



```
> barplot(Administration,Profit)
```



```
> barplot(Marketing.Spend,Profit)
```



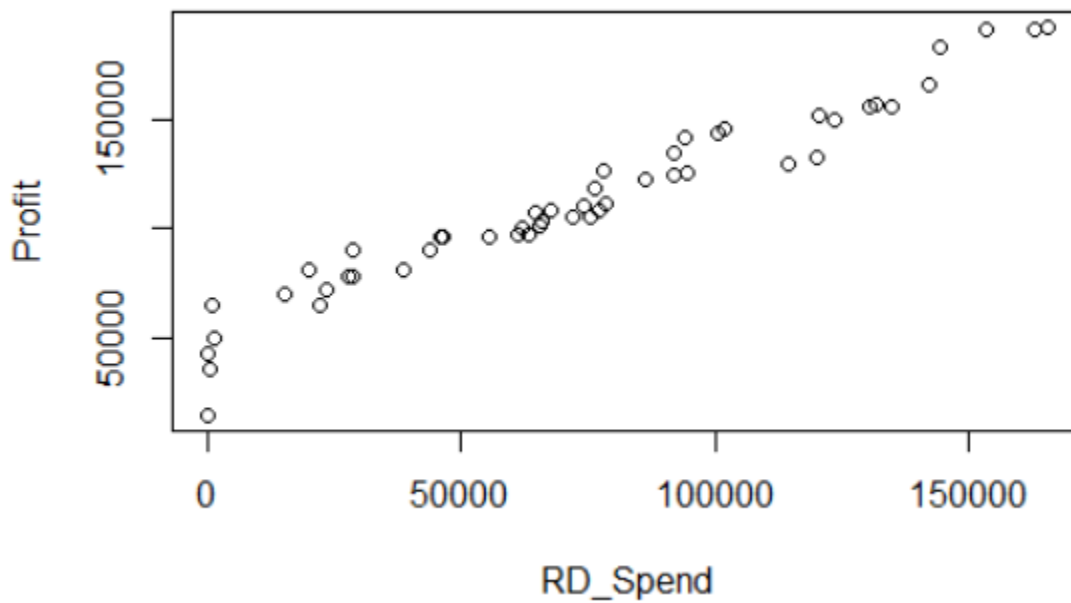
```
> stem(Administration)
```

The decimal point is 4 digit(s) to the right of the |

```

4 | 12
6 | 6
8 | 3551269
10 | 0136914466799
12 | 233477789557
14 | 04567913344578
16 |
18 | 3
> library(plyr)
> State <- revalue(State,c("New York"="0", "California"="1", "Florida"="2"))
> startups <- cbind(RD_Spend=R.D.Spend,Administration,Marketing_Spend=Marketing.Sp
end,State,Profit)
> startups <- as.data.frame(startups)
> attach(startups)
> View(startups)
> plot(RD_Spend,Profit)

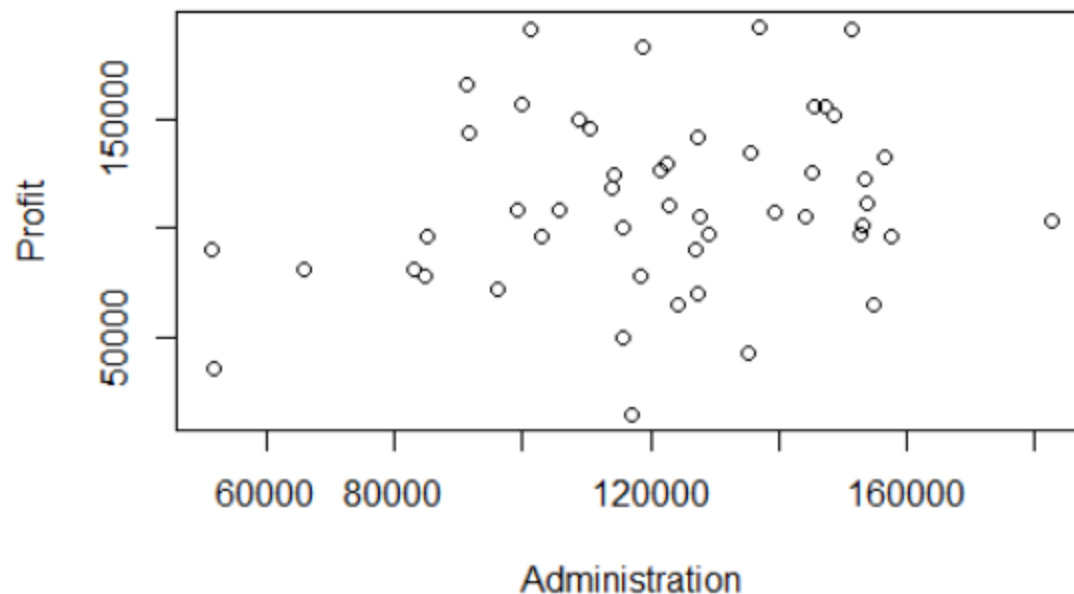
```



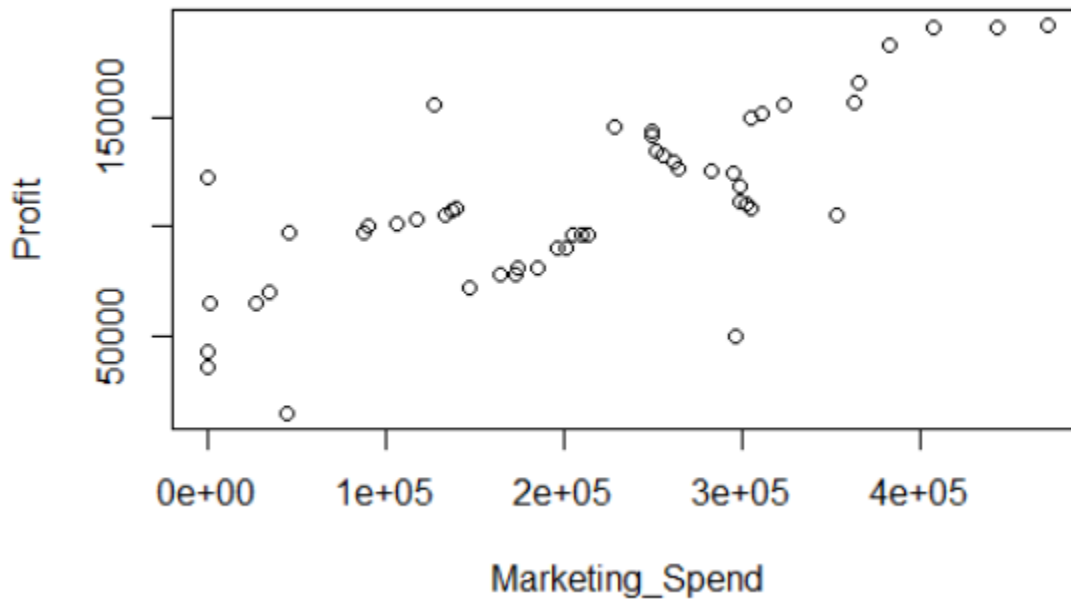
```

> plot(Administration,Profit)

```

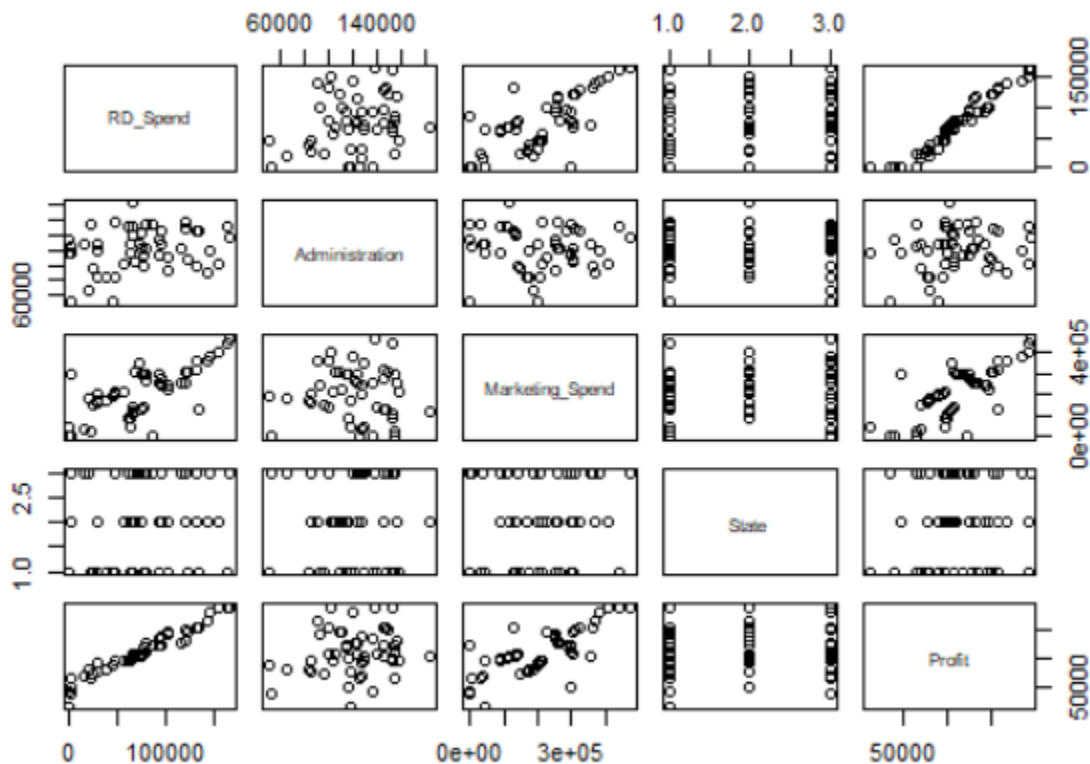


```
> plot(Marketing_Spend,Profit)
```



```
> plot(State,Profit)
```

```
> pairs(startups) #Find the correlation between Output (Profit) & inputs (R.D Spend, Administration, Marketing, State) - SCATTER DIAGRAM
```



```
> cor(startups)
```

	RD_Spend	Administration	Marketing_Spend	State	Profit
RD_Spend	1.0000000	0.24195525	0.72424813	0.10468511	0.9729005
Administration	0.2419552	1.0000000	-0.03215388	0.01184720	0.2007166
Marketing_Spend	0.7242481	-0.03215388	1.0000000	0.07766961	0.7477657

State	0.1046851	0.01184720	0.07766961	1.00000000	0.1017963
Profit	0.9729005	0.20071657	0.74776572	0.10179631	1.00000000

```
> startups_model <- lm(Profit~RD_Spend+Administration+Marketing_Spend+State)
> summary(startups_model)
```

```
Call:
lm(formula = Profit ~ RD_Spend + Administration + Marketing_Spend +
    State)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-33504  -4736      90    6672   17338
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.013e+04  6.885e+03   7.281 4.44e-09 ***
RD_Spend      8.060e-01  4.641e-02  17.369 < 2e-16 ***
Administration -2.700e-02  5.223e-02  -0.517   0.608
Marketing_Spend  2.698e-02  1.714e-02   1.574   0.123
State2        1.988e+02  3.371e+03   0.059   0.953
State0       -4.189e+01  3.256e+03  -0.013   0.990
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

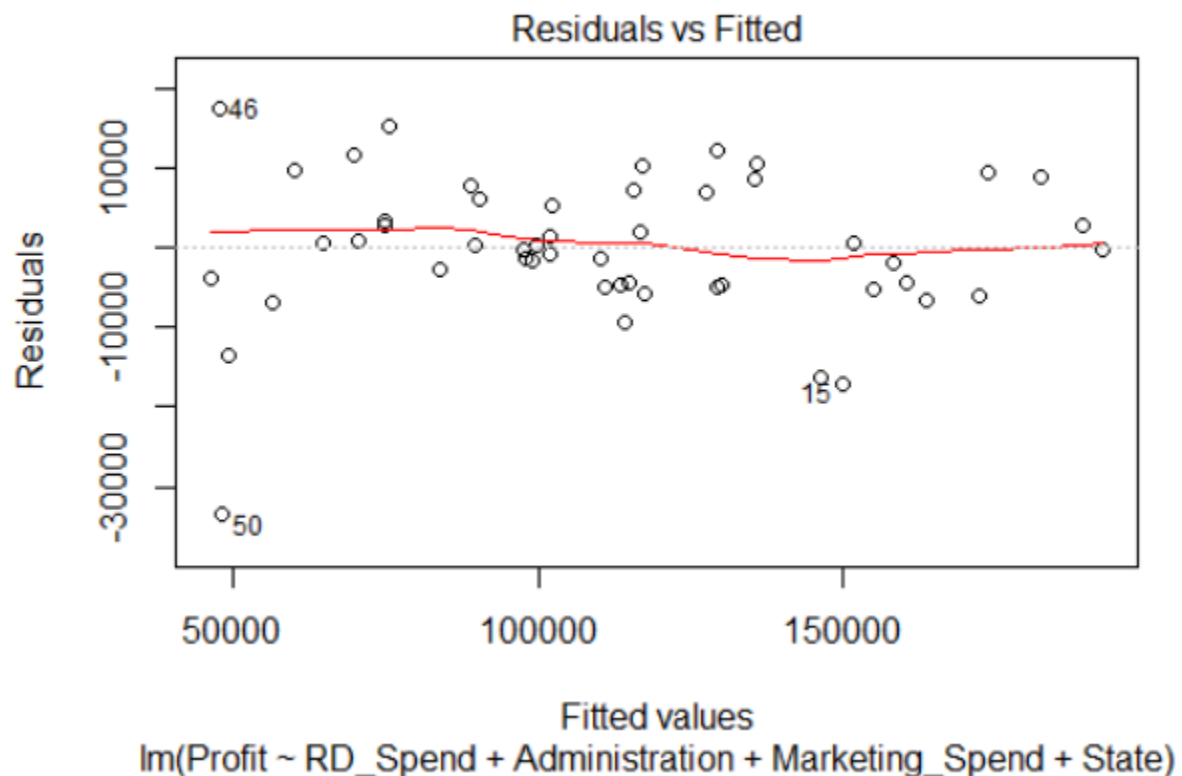
```
Residual standard error: 9439 on 44 degrees of freedom
Multiple R-squared:  0.9508, Adjusted R-squared:  0.9452
F-statistic: 169.9 on 5 and 44 DF, p-value: < 2.2e-16
```

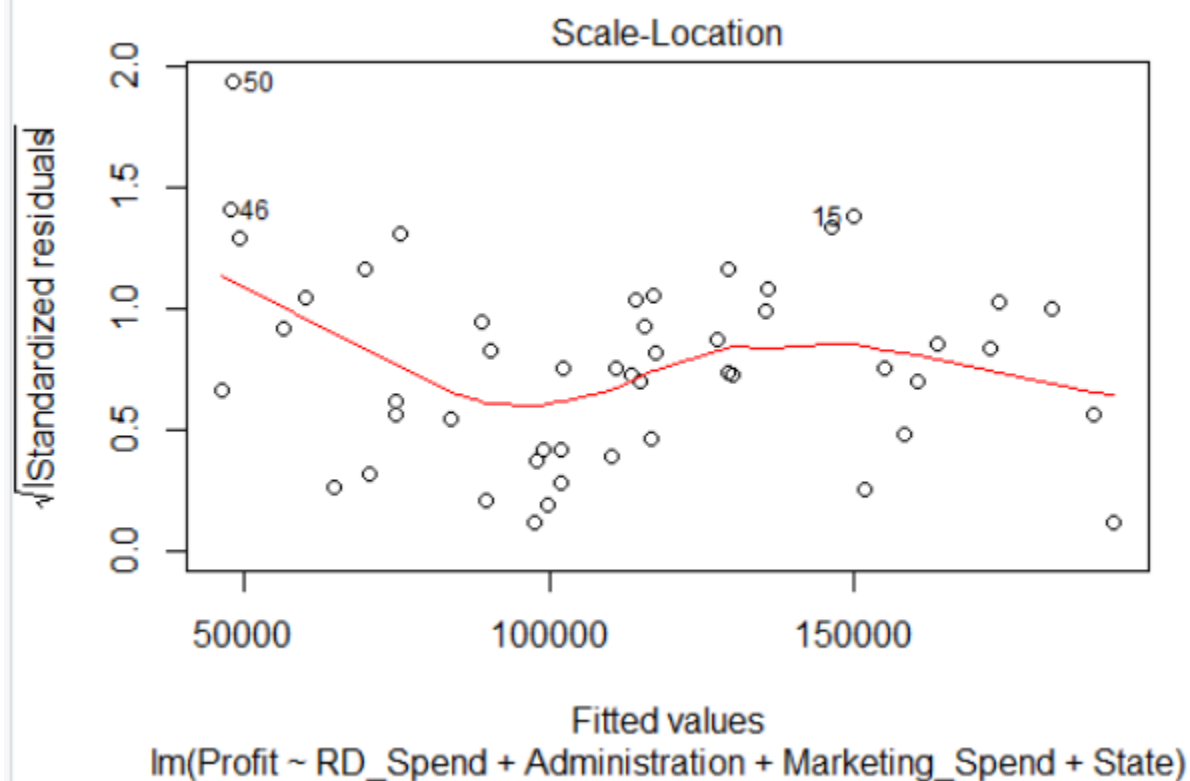
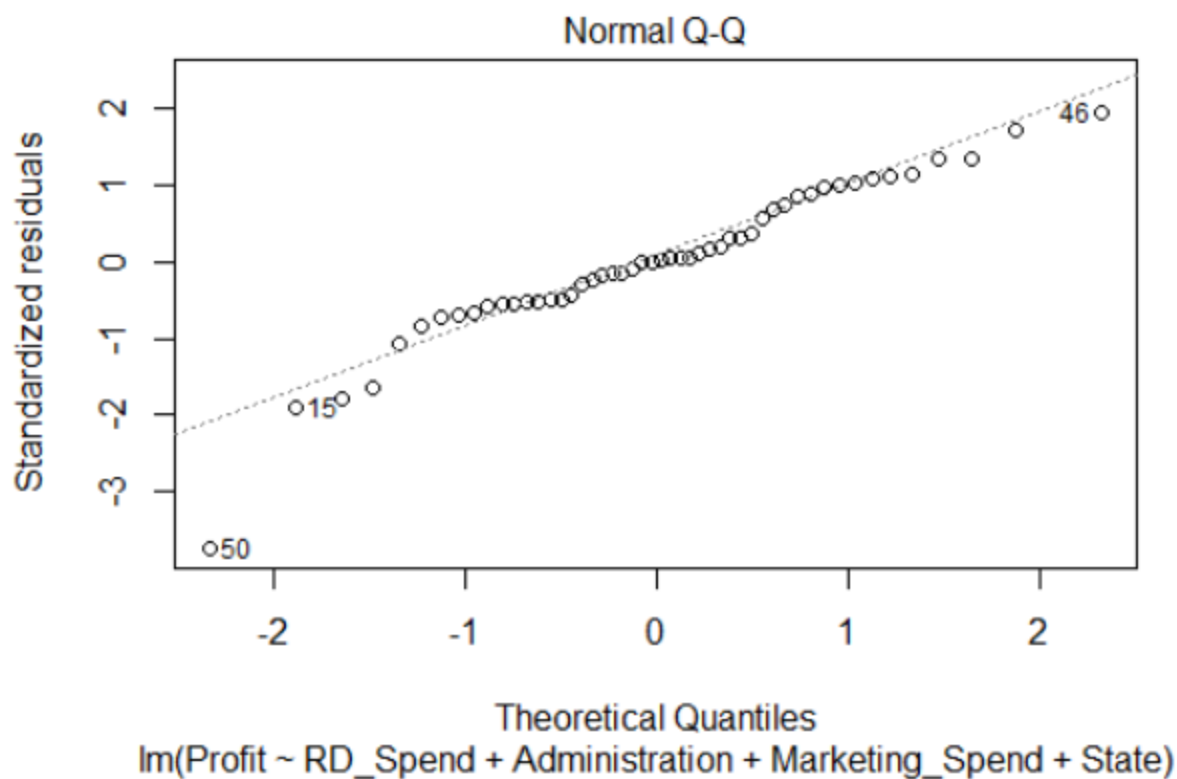
```
> confint(startups_model,level = 0.95)
                2.5 %          97.5 %
(Intercept)  3.624990e+04  6.400079e+04
RD_Spend      7.124960e-01  8.995502e-01
Administration -1.322701e-01  7.826145e-02
Marketing_Spend -7.567888e-03  6.152761e-02
State2        -6.595030e+03  6.992607e+03
State0       -6.604003e+03  6.520229e+03
> predict(startups_model,interval="predict")
```

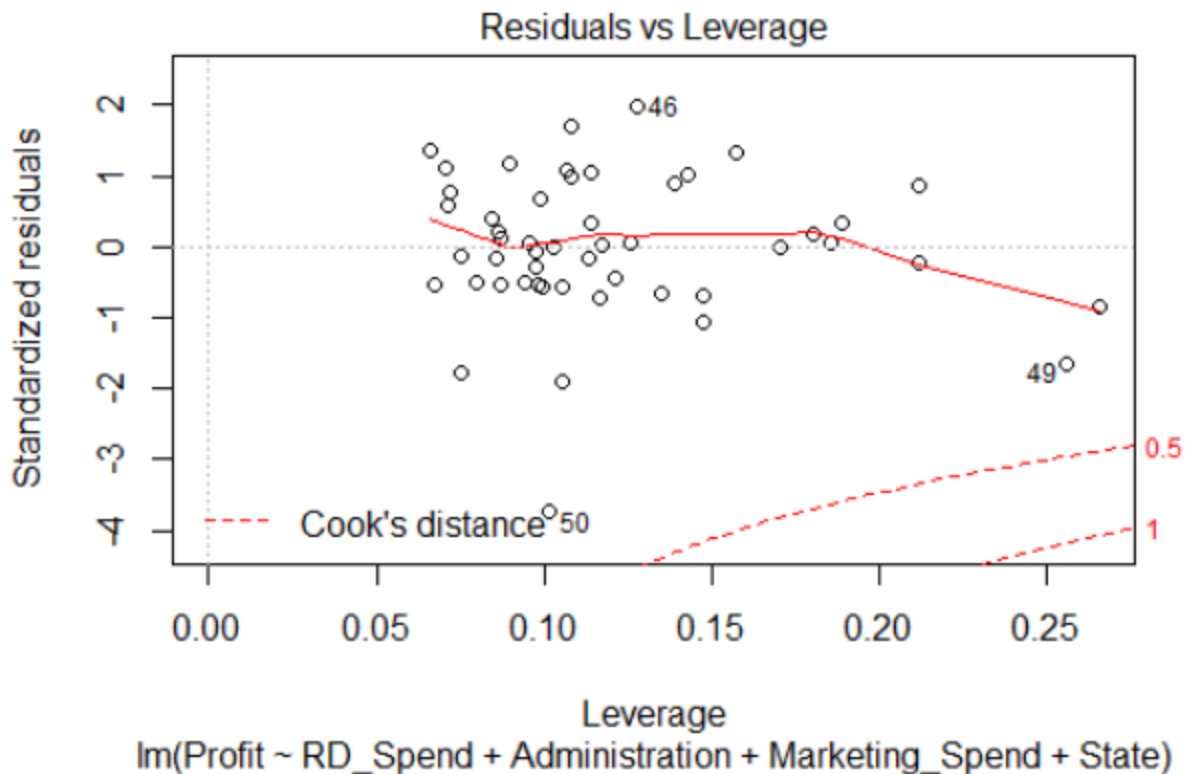
	fit	lwr	upr
1	192390.57	171809.58	212971.56
2	189071.32	168333.25	209809.39
3	182276.19	161942.89	202609.48
4	173584.98	153506.80	193663.15
5	172277.13	151902.62	192651.64
6	163473.81	143374.36	183573.26
7	158099.29	137157.37	179041.21
8	160155.64	140256.02	180055.27
9	151634.74	131721.22	171548.27
10	154829.66	134830.91	174828.41
11	135664.64	115806.41	155522.87
12	135528.60	115504.32	155552.88
13	129282.92	109644.03	148921.80
14	127431.25	107734.32	147128.17
15	149694.38	129692.95	169695.81
16	146143.64	126416.35	165870.92
17	116854.07	97169.00	136539.15
18	130085.41	110253.18	149917.64
19	129149.73	109498.15	148801.30
20	115594.19	94653.16	136535.22
21	116570.73	96740.77	136400.70
22	117201.51	96934.78	137468.23
23	114833.31	95067.89	134598.72
24	110123.80	90304.80	129942.80
25	113294.37	93360.10	133228.65
26	102200.27	82513.59	121886.95
27	110765.30	90820.04	130710.57

28	114279.80	93905.52	134654.09
29	101818.59	81152.35	122484.82
30	101721.04	81793.24	121648.85
31	99629.01	79524.04	119733.98
32	97617.30	77642.16	117592.43
33	98988.24	78917.42	119059.05
34	98061.36	78337.66	117785.06
35	88974.70	68672.65	109276.76
36	90420.01	70481.87	110358.14
37	75423.09	55399.66	95446.52
38	89577.70	68868.44	110286.96
39	69606.52	49144.54	90068.51
40	83684.98	63755.23	103614.72
41	74762.75	54954.39	94571.10
42	74956.31	54877.69	95034.94
43	70575.99	50742.17	90409.81
44	60100.27	40085.44	80115.09
45	64585.15	44399.30	84771.00
46	47588.36	27386.47	67790.26
47	56272.99	34873.32	77672.67
48	46468.23	26325.48	66610.99
49	49123.07	27804.16	70441.98
50	48185.04	28219.55	68150.53

```
> plot(startups_model)
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
```







```
> startups_model1 <- lm(Profit~RD_Spend+log(Administration)+Marketing_Spend+State)
> summary(startups_model1)
```

```
Call:
lm(formula = Profit ~ RD_Spend + log(Administration) + Marketing_Spend + State)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-33426  -4738      60    6671   17413
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  7.230e+04  6.366e+04   1.136   0.262
RD_Spend      8.036e-01  4.618e-02  17.403 <2e-16 ***
log(Administration) -2.182e+03  5.473e+03  -0.399   0.692
Marketing_Spend  2.793e-02  1.693e-02   1.649   0.106
State2        1.968e+02  3.376e+03   0.058   0.954
State0       -6.009e+01  3.261e+03  -0.018   0.985
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 9451 on 44 degrees of freedom
Multiple R-squared:  0.9506, Adjusted R-squared:  0.945
F-statistic: 169.5 on 5 and 44 DF, p-value: < 2.2e-16
```

```
> confint(startups_model1,level = 0.95)
                2.5 %          97.5 %
(Intercept) -5.600138e+04 2.006082e+05
RD_Spend      7.105428e-01 8.966645e-01
log(Administration) -1.321174e+04 8.848727e+03
Marketing_Spend -6.198072e-03 6.205251e-02
State2        -6.607466e+03 7.001109e+03
```

State0 -6.632879e+03 6.512698e+03

```
> predict(startups_model1, interval="predict")
```

	fit	lwr	upr
1	192493.48	171895.66	213091.30
2	189344.35	168648.33	210040.38
3	182058.47	161728.50	202388.44
4	173474.21	153382.08	193566.34
5	172005.10	151635.92	192374.28
6	163242.29	143166.14	183318.43
7	158088.71	137120.29	179057.13
8	160319.18	140420.42	180217.94
9	151832.86	131927.87	171737.85
10	154635.95	134647.31	174624.58
11	135462.57	115618.09	155307.04
12	135249.76	115259.23	155240.29
13	129264.34	109599.98	148928.71
14	127506.85	107785.17	147228.52
15	149957.48	129996.09	169918.86
16	146025.25	126283.21	165767.29
17	116835.35	97118.70	136552.00
18	130274.39	110440.19	150108.59
19	129061.73	109392.99	148730.46
20	115639.92	94673.23	136606.60
21	116523.31	96665.63	136381.00
22	117553.94	97363.34	137744.54
23	114870.10	95075.54	134664.66
24	110043.43	90205.65	129881.21
25	112982.22	93115.63	132848.81
26	102278.53	82564.02	121993.04
27	110865.35	90902.84	130827.87
28	114400.93	93989.50	134812.36
29	102449.39	82118.53	122780.25
30	101912.47	81984.18	121840.76
31	99431.69	79337.49	119525.89
32	97797.41	77816.84	117777.98
33	98871.27	78782.75	118959.80
34	97908.28	78182.68	117633.88
35	89389.37	69210.12	109568.61
36	90197.66	70275.57	110119.76
37	75513.52	55453.83	95573.20
38	89561.95	68194.77	110929.12
39	69466.45	48877.24	90055.67
40	83467.82	63540.51	103395.12
41	74749.51	54896.67	94602.35
42	74754.72	54674.61	94834.82
43	70403.81	50573.21	90234.40
44	60052.63	39980.44	80124.81
45	64847.96	44687.50	85008.41
46	47512.77	27252.26	67773.28
47	56419.05	34981.88	77856.22
48	46526.29	26331.13	66721.45
49	49000.71	27166.24	70835.18
50	48107.22	28098.05	68116.38

```
> startups_model2 <- lm(Profit~RD_Spend+log(Administration))
> summary(startups_model2)
```

Call:

```
lm(formula = Profit ~ RD_Spend + log(Administration))
```

Residuals:

Min	1Q	Median	3Q	Max
-33851	-4928	-180	6385	17863

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.021e+05	6.087e+04	1.677	0.100

```
RD_Spend      8.614e-01  3.049e-02  28.250  <2e-16 ***
log(Administration) -4.589e+03  5.260e+03  -0.872    0.387
---
signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 9440 on 47 degrees of freedom
Multiple R-squared:  0.9474, Adjusted R-squared:  0.9451
F-statistic: 423.2 on 2 and 47 DF, p-value: < 2.2e-16
```

```
> confint(startups_model2, level = 0.95)
```

```
                2.5 %          97.5 %
(Intercept)    -2.036615e+04  2.245359e+05
RD_Spend        8.000723e-01  9.227603e-01
log(Administration) -1.517164e+04  5.993720e+03
```

```
> predict(startups_model2, interval="predict")
```

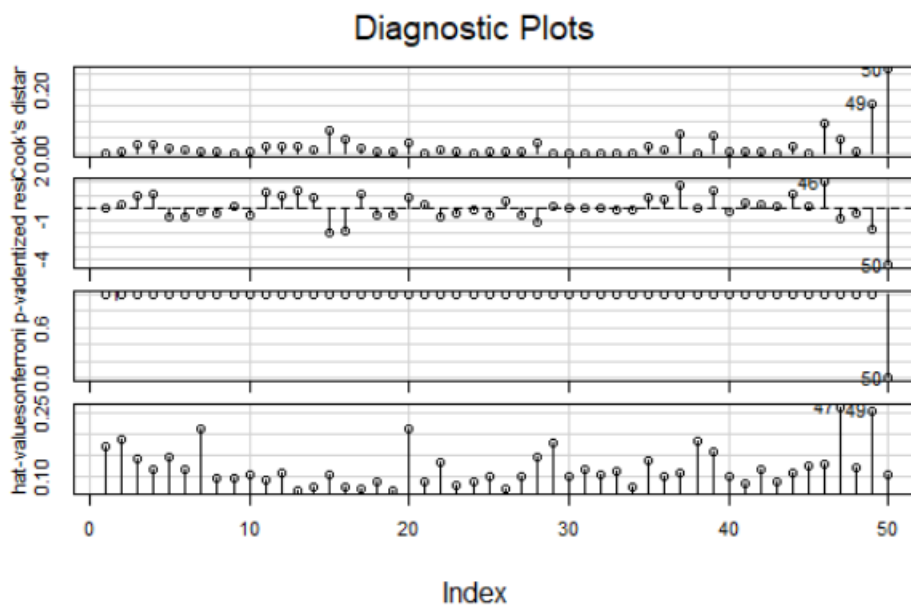
```
      fit      lwr      upr
1  190245.74 170316.05 210175.42
2  187414.16 167491.55 207336.78
3  181377.22 161414.61 201339.82
4  172831.62 153173.81 192489.44
5  172079.12 152114.53 192043.72
6  162861.89 143191.59 182532.19
7  163438.26 143875.70 183000.82
8  159771.57 140257.77 179285.36
9  151268.46 131814.72 170722.19
10 155113.21 135640.59 174585.83
11 136579.96 117295.90 155864.03
12 136366.03 116877.60 155854.46
13 128999.83 109776.67 148223.00
14 127102.25 107855.07 146349.42
15 150516.81 131011.62 170022.00
16 146969.31 127637.37 166301.25
17 115556.88  96373.58 134740.17
18 129084.14 109773.36 148394.93
19 127678.34 108459.50 146897.18
20 121728.88 102358.05 141099.70
21 114342.85  95158.85 133526.85
22 114803.76  95424.75 134182.77
23 112050.72  92865.88 131235.56
24 107169.49  87959.12 126379.86
25 115652.53  96383.10 134921.97
26 103426.32  84139.64 122713.00
27 112464.32  93167.19 131761.45
28 110239.16  91037.78 129440.53
29 103386.04  83613.86 123158.22
30 103813.60  84407.35 123219.85
31 101988.64  82796.56 121180.72
32  99973.75  80551.52 119395.99
33 102697.55  83473.00 121922.09
34  96917.66  77676.43 116158.88
35  87154.44  67582.31 106726.56
36  89632.93  70154.84 109111.02
37  72845.03  53419.00  92271.06
38  90279.59  69308.71 111250.47
39  68588.97  48455.57  88722.38
40  83323.45  63781.91 102864.99
41  73241.19  53860.95  92621.43
42  74041.32  54481.32  93601.32
43  69795.43  50344.93  89245.92
44  61498.72  41930.02  81067.43
45  66351.34  46571.87  86130.82
46  49121.28  29386.81  68855.76
47  49711.81  30033.88  69389.74
48  47860.81  28007.70  67713.92
49  52742.97  31704.16  73781.77
50  48532.62  28830.56  68234.68
```

```
>
> library(mvinfluence)
> influence.measures(startups_model)
Influence measures of lm(formula = Profit ~ RD_Spend + Administration + Marketin
g_Spend + State) :
```

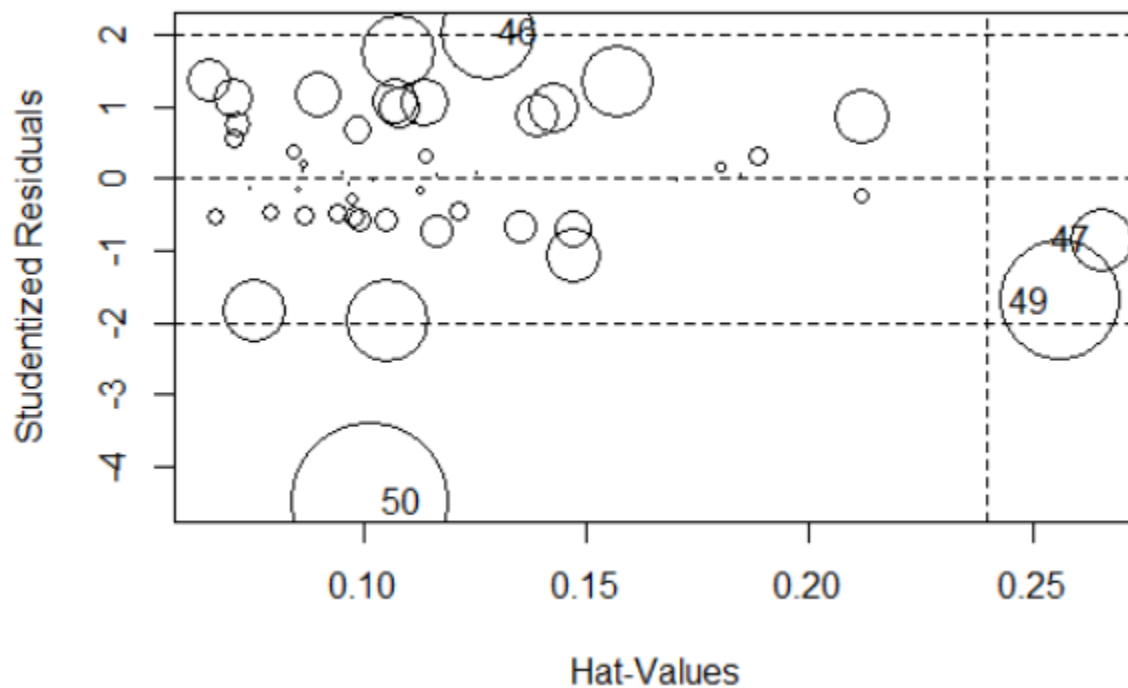
	dfb.1_	dfb.RD_S	dfb.Admn	dfb.Mr_S	dfb.Stt2	dfb.Stt0	dffit	cov.r
1	0.00263	-0.000680	-0.00108	-0.002943	0.001137	-0.002293	-0.00671	1.384
2	-0.04961	0.020841	0.04627	0.058280	-0.082437	-0.070955	0.15256	1.395
3	0.08011	0.197811	-0.17477	-0.013702	0.153248	-0.028648	0.40914	1.165
4	-0.03595	0.110000	-0.04970	0.073783	-0.047849	0.163879	0.37650	1.113
5	-0.10434	-0.153851	0.16342	0.047737	-0.115870	0.017478	-0.28836	1.259
6	-0.04629	-0.081405	0.10566	-0.033055	0.027220	-0.115816	-0.26364	1.207
7	-0.02130	-0.095187	0.00468	0.082074	0.037236	0.050562	-0.12099	1.445
8	0.05670	-0.045130	-0.04118	0.001538	-0.079214	0.007763	-0.15671	1.226
9	-0.01048	0.000992	0.00845	0.005091	-0.002030	0.010515	0.02068	1.269
10	-0.07333	-0.087676	0.06482	0.009105	0.113458	0.114051	-0.19312	1.227
11	0.11698	0.186811	-0.13740	-0.159583	0.227283	-0.009802	0.36595	1.046
12	0.22674	0.152695	-0.19750	-0.063320	-0.180498	-0.191722	0.34058	1.127
13	-0.01749	0.069420	0.01009	-0.048411	0.246939	-0.005732	0.36117	0.954
14	-0.00754	0.005568	0.05424	0.040526	-0.144106	-0.139683	0.20968	1.144
15	0.26742	-0.221204	-0.25724	0.142195	-0.359607	0.022591	-0.67871	0.761
16	-0.00258	-0.208289	0.06663	0.071114	0.021586	-0.300602	-0.52394	0.790
17	0.03723	-0.055403	0.02986	0.116725	-0.217604	-0.202959	0.30836	1.040
18	0.08149	0.035255	-0.07538	-0.061166	0.013546	-0.089993	-0.15985	1.211
19	-0.00866	-0.003027	0.01978	-0.017913	-0.089991	0.002396	-0.14249	1.183
20	0.00949	0.252210	0.03934	-0.342025	0.056267	0.163205	0.44287	1.316
21	0.00920	-0.018937	0.00127	0.034093	-0.043026	-0.038229	0.06425	1.249
22	0.16246	0.134008	-0.16322	-0.156986	0.024662	-0.123303	-0.26328	1.248
23	0.02844	0.057093	-0.02567	-0.065599	-0.080087	-0.001184	-0.14418	1.206
24	-0.00300	0.017345	0.00492	-0.019954	-0.025200	-0.000520	-0.04652	1.251
25	-0.08800	-0.077455	0.08926	0.087987	-0.013268	-0.093171	-0.17298	1.225
26	0.01269	0.012139	0.04637	-0.028528	-0.091010	-0.099577	0.15683	1.181
27	0.01876	-0.047078	-0.04093	0.086363	-0.120147	-0.002104	-0.18499	1.221
28	0.16992	0.271462	-0.14611	-0.339679	0.054174	-0.198665	-0.44228	1.151
29	-0.04142	-0.004892	0.05451	-0.014043	0.037581	0.001794	0.07940	1.395
30	0.00788	-0.001210	-0.01152	0.007045	-0.001871	-0.014675	-0.02593	1.271
31	0.00452	0.004911	-0.00318	-0.008237	0.008083	0.000222	0.01251	1.300
32	0.00132	-0.000298	-0.00210	0.001610	-0.000431	-0.002779	-0.00500	1.279
33	-0.02577	-0.029851	0.00520	0.042128	0.023004	0.031218	-0.06200	1.289
34	-0.01226	0.005720	0.01076	-0.000214	-0.026781	-0.001052	-0.03977	1.238
35	-0.13840	-0.196836	0.24231	0.173390	-0.173841	-0.153489	0.35397	1.197
36	0.09973	-0.049889	-0.10222	0.034443	0.001307	0.126044	0.22205	1.196
37	-0.10755	-0.379353	0.18952	0.218405	0.334034	0.033735	0.61014	0.850
38	0.01840	0.001322	-0.01609	-0.000850	-0.007621	-0.008050	0.02054	1.408
39	0.32020	-0.189819	-0.31345	0.109261	0.010955	0.273511	0.58408	1.060
40	-0.07434	0.011576	0.05092	-0.005414	0.049682	0.051171	-0.09721	1.257
41	0.02107	-0.063137	0.02014	0.044268	-0.066547	-0.063116	0.11560	1.228
42	0.05957	-0.022659	-0.05101	-0.006525	0.066841	0.005162	0.11358	1.278
43	0.01852	-0.010791	-0.00820	0.004902	-0.016530	-0.016757	0.03122	1.256
44	0.02429	-0.090858	0.05891	-0.085052	0.047181	0.220181	0.37544	1.093
45	-0.00188	-0.005257	0.01339	-0.004732	-0.009633	-0.011309	0.02616	1.312
46	0.09538	-0.212843	0.09139	-0.189969	0.108210	0.428337	0.77900	0.758
47	0.10683	0.434369	-0.14265	-0.364064	-0.144471	-0.025892	-0.50219	1.419
48	-0.02930	0.046774	-0.04694	0.031389	0.056945	0.068742	-0.16247	1.272
49	-0.78383	-0.112734	0.70160	0.418630	-0.124090	-0.373999	-0.98871	1.051
50	-0.56603	0.578956	-0.11423	0.080954	0.626360	0.703325	-1.50721	0.128
	cook.d	hat	inf					
1	7.68e-06	0.1705						
2	3.96e-03	0.1884						
3	2.79e-02	0.1424						
4	2.36e-02	0.1140						
5	1.40e-02	0.1471						
6	1.17e-02	0.1163						
7	2.49e-03	0.2119	*					
8	4.17e-03	0.0942						
9	7.29e-05	0.0958						

10	6.31e-03	0.1052
11	2.21e-02	0.0897
12	1.94e-02	0.1080
13	2.13e-02	0.0657
14	7.40e-03	0.0721
15	7.20e-02	0.1055
16	4.34e-02	0.0754
17	1.58e-02	0.0708
18	4.33e-03	0.0868
19	3.44e-03	0.0671
20	3.29e-02	0.2118
21	7.03e-04	0.0866
22	1.17e-02	0.1350
23	3.53e-03	0.0795
24	3.69e-04	0.0854
25	5.07e-03	0.0980
26	4.16e-03	0.0709
27	5.79e-03	0.0993
28	3.25e-02	0.1471
29	1.07e-03	0.1802
30	1.15e-04	0.0973
31	2.67e-05	0.1169
32	4.26e-06	0.1026
33	6.55e-04	0.1131
34	2.70e-04	0.0750
35	2.10e-02	0.1389
36	8.32e-03	0.0985
37	5.92e-02	0.1079
38	7.19e-05	0.1851
39	5.58e-02	0.1570
40	1.61e-03	0.0975
41	2.27e-03	0.0842
42	2.20e-03	0.1140
43	1.66e-04	0.0870
44	2.34e-02	0.1069
45	1.17e-04	0.1259
46	9.44e-02	0.1277
47	4.23e-02	0.2654
48	4.48e-03	0.1211
49	1.56e-01	0.2559
50	2.64e-01	0.1015

> influenceIndexPlot(startups_model,id.n =3)



```
> influencePlot(startups_model, id.n=3)
```



	StudRes	Hat	CookD
46	2.0357210	0.1277290	0.09439478
47	-0.8354542	0.2654200	0.04232333
49	-1.6860294	0.2558868	0.15637613
50	-4.4845939	0.1014896	0.26395944

```
>
> ## Regression after deleting the 49th and 50th observation, which is influential observation
>
> # Logarithmic Transformation
> startups_model3<-lm(Profit~RD_Spend+log(Administration)+Marketing_Spend+log(State),data=startups[-c(49,50),])
> summary(startups_model3)
```

```
Call:
lm(formula = Profit ~ RD_Spend + log(Administration) + Marketing_Spend + log(State), data = startups[-c(49, 50), ])
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-15952  -5122  -1868    5748  13769
```

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.259e+05  5.682e+04   2.215  0.0321 *
RD_Spend      7.881e-01  3.674e-02  21.452 <2e-16 ***
log(Administration) -6.357e+03  4.865e+03  -1.307  0.1983
Marketing_Spend  1.819e-02  1.360e-02   1.338  0.1880
log(State)     -6.988e+02  2.399e+03  -0.291  0.7722
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 7448 on 43 degrees of freedom
Multiple R-squared:  0.9625,    Adjusted R-squared:  0.9591
F-statistic: 276.2 on 4 and 43 DF,  p-value: < 2.2e-16
```

```
> confint(startups_model3,level = 0.95)
```

	2.5 %	97.5 %
(Intercept)	1.129255e+04	2.404707e+05
RD_Spend	7.139937e-01	8.621648e-01
log(Administration)	-1.616879e+04	3.455246e+03
Marketing_Spend	-9.231786e-03	4.562130e-02
log(State)	-5.536268e+03	4.138733e+03

> predict(startups_model3,interval = "predict")

	fit	lwr	upr
1	188824.76	172728.64	204920.88
2	186277.54	169881.77	202673.31
3	180486.18	164669.44	196302.93
4	171589.82	155883.61	187296.03
5	171438.65	155605.14	187272.15
6	162472.34	146739.04	178205.63
7	158650.41	142115.60	175185.22
8	158405.22	142933.74	173876.70
9	150072.78	134507.87	165637.70
10	154914.25	139197.89	170630.61
11	136057.26	120732.95	151381.56
12	137122.64	121364.05	152881.24
13	129194.70	113985.60	144403.80
14	127860.10	112315.70	143404.50
15	148555.19	133087.47	164022.90
16	145649.45	130171.52	161127.39
17	117743.78	102225.20	133262.35
18	129302.29	113806.00	144798.59
19	129041.14	113792.02	144290.26
20	117309.84	100741.17	133878.51
21	117399.30	101786.80	133011.79
22	116424.30	100656.98	132191.62
23	114739.94	99346.07	130133.81
24	110622.97	95205.25	126040.69
25	115249.28	99485.69	131012.87
26	104049.15	88489.37	119608.94
27	111692.42	96325.94	127058.91
28	113619.02	97729.66	129508.37
29	102586.58	86865.28	118307.89
30	102875.93	87225.15	118526.72
31	101803.14	86331.89	117274.39
32	99023.41	83320.49	114726.33
33	101876.80	85998.34	117755.25
34	99659.66	84380.22	114939.10
35	90224.01	74242.48	106205.55
36	92960.51	77199.73	108721.28
37	76938.83	61359.58	92518.07
38	95257.22	78055.81	112458.62
39	73888.65	57403.74	90373.56
40	87453.65	71675.36	103231.95
41	77419.78	61760.70	93078.85
42	78241.35	62610.99	93871.70
43	74267.32	58592.72	89941.92
44	63256.72	47409.22	79104.22
45	67912.02	51948.94	83875.11
46	51376.57	35340.75	67412.38
47	57721.47	40924.30	74518.63
48	50768.83	34762.86	66774.80

```
>
> startups_model4<-lm(Profit~RD_Spend+Administration+Marketing_Spend+State,data
=startups[-c(49,50),])
> summary(startups_model4)
```

```
Call:
lm(formula = Profit ~ RD_Spend + Administration + Marketing_Spend +
    State, data = startups[-c(49, 50), ])

Residuals:
```


Min	1Q	Median	3Q	Max
-15944	-4787	-1904	6066	13646

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.960e+04	6.314e+03	9.438	4.84e-12 ***
RD_Spend	7.898e-01	3.677e-02	21.480	< 2e-16 ***
Administration	-6.257e-02	4.451e-02	-1.406	0.167
Marketing_Spend	1.705e-02	1.369e-02	1.245	0.220
State	-3.267e+02	1.326e+03	-0.246	0.806

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7429 on 43 degrees of freedom

Multiple R-squared: 0.9627, Adjusted R-squared: 0.9593

F-statistic: 277.7 on 4 and 43 DF, p-value: < 2.2e-16

> confint(startups_model4, level = 0.95)

	2.5 %	97.5 %
(Intercept)	4.686351e+04	7.233156e+04
RD_Spend	7.156655e-01	8.639736e-01
Administration	-1.523350e-01	2.718785e-02
Marketing_Spend	-1.056337e-02	4.466542e-02
State	-2.999886e+03	2.346473e+03

> predict(startups_model4, interval="predict")

	fit	lwr	upr
1	188691.66	172587.13	204796.20
2	185790.36	169443.69	202137.02
3	180761.89	164957.36	196566.42
4	171753.79	156037.51	187470.07
5	171708.11	155895.94	187520.29
6	162717.76	146953.10	178482.43
7	158559.69	142084.11	175035.28
8	158272.22	142817.48	173726.97
9	149831.70	134237.67	165425.73
10	155082.93	139421.47	170744.39
11	136424.22	121112.15	151736.30
12	137298.24	121575.95	153020.53
13	129372.67	114209.55	144535.80
14	127758.00	112302.73	143213.27
15	148255.71	132772.13	163739.29
16	145861.38	130373.56	161349.20
17	117785.68	102361.60	133209.76
18	129119.65	113599.84	144639.46
19	129293.69	114081.62	144505.77
20	117267.45	100725.31	133809.60
21	117465.07	101947.29	132982.84
22	116019.62	100166.02	131873.22
23	114875.42	99535.54	130215.30
24	110862.03	95484.58	126239.48
25	115652.83	99831.96	131473.71
26	103964.34	88480.70	119447.98
27	111706.92	96386.12	127027.72
28	113590.61	97697.71	129483.50
29	101698.66	85726.01	117671.31
30	102684.96	87018.83	118351.09
31	102226.36	86776.05	117676.68
32	98853.23	83139.66	114566.80
33	102052.45	86219.97	117884.93
34	99985.39	84735.05	115235.73
35	89665.88	73668.07	105663.70
36	93142.75	77369.00	108916.49
37	77062.37	61552.25	92572.49
38	94228.72	77804.70	110652.73
39	73627.50	57335.57	89919.43
40	87516.52	71802.12	103230.92
41	77510.05	61944.93	93075.17

```

42 78478.23 62898.24 94058.22
43 74447.53 58817.81 90077.26
44 63499.27 47661.89 79336.64
45 67583.60 51650.63 83516.57
46 51671.18 35643.46 67698.89
47 57802.16 41082.45 74521.88
48 50796.68 34870.47 66722.89

```

```

>
> startups_model_exp<-lm(log(Profit)~RD_Spend+Administration+Marketing_Spend+State,data=startups[-c(49,50),])
> summary(startups_model_exp)

```

```

Call:
lm(formula = log(Profit) ~ RD_Spend + Administration + Marketing_Spend + State, data = startups[-c(49, 50), ])

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-0.36095 -0.03876  0.00946  0.05837  0.17095

```

```

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.111e+01  8.242e-02 134.844  <2e-16 ***
RD_Spend     7.431e-06  4.800e-07  15.482  <2e-16 ***
Administration -7.457e-07  5.810e-07  -1.284    0.206
Marketing_Spend -5.233e-09  1.787e-07  -0.029    0.977
State        6.658e-03  1.730e-02   0.385    0.702
---

```

```

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

Residual standard error: 0.09697 on 43 degrees of freedom
Multiple R-squared:  0.9252, Adjusted R-squared:  0.9182
F-statistic: 132.9 on 4 and 43 DF, p-value: < 2.2e-16

```

```

> confint(startups_model_exp,level = 0.95)
                2.5 %          97.5 %
(Intercept)  1.094773e+01 1.128016e+01
RD_Spend     6.462949e-06 8.398819e-06
Administration -1.917399e-06 4.259184e-07
Marketing_Spend -3.656845e-07 3.552184e-07
State        -2.823519e-02 4.155100e-02
> predict(startups_model_exp,interval="predict")

```

```

      fit      lwr      upr
1  12.25805 12.04784 12.46827
2  12.21364 12.00026 12.42701
3  12.18991 11.98361 12.39620
4  12.11623 11.91109 12.32138
5  12.11318 11.90678 12.31957
6  12.03755 11.83177 12.24332
7  12.01048 11.79542 12.22553
8  11.98527 11.78354 12.18700
9  11.91712 11.71357 12.12067
10 11.95445 11.75002 12.15888
11 11.80089 11.60102 12.00076
12 11.79893 11.59370 12.00415
13 11.72850 11.53057 11.92642
14 11.70182 11.50009 11.90356
15 11.90046 11.69835 12.10257
16 11.89212 11.68996 12.09429
17 11.60825 11.40692 11.80958
18 11.72764 11.52506 11.93022
19 11.72235 11.52379 11.92092
20 11.66161 11.44569 11.87754
21 11.60076 11.39821 11.80331
22 11.60018 11.39324 11.80712
23 11.58396 11.38372 11.78419
24 11.54863 11.34791 11.74935

```

```

25 11.63165 11.42514 11.83816
26 11.49633 11.29422 11.69844
27 11.57883 11.37885 11.77882
28 11.57254 11.36509 11.77999
29 11.48126 11.27277 11.68975
30 11.50674 11.30225 11.71124
31 11.50122 11.29955 11.70289
32 11.47388 11.26877 11.67899
33 11.49518 11.28852 11.70185
34 11.46165 11.26259 11.66072
35 11.34689 11.13807 11.55571
36 11.41135 11.20545 11.61724
37 11.24446 11.04200 11.44691
38 11.40881 11.19443 11.62319
39 11.23410 11.02144 11.44675
40 11.34433 11.13921 11.54945
41 11.24497 11.04179 11.44814
42 11.27050 11.06713 11.47387
43 11.22377 11.01976 11.42779
44 11.15396 10.94724 11.36069
45 11.16981 10.96184 11.37779
46 11.04876 10.83955 11.25797
47 11.04911 10.83087 11.26736
48 11.01961 10.81173 11.22750

```

```

>
> startups_model_exp1<-lm(log(Profit)~RD_Spend+Marketing_Spend+State,data=startups[-c(49,50),])
> summary(startups_model_exp1)

```

```

Call:
lm(formula = log(Profit) ~ RD_Spend + Marketing_Spend + State,
    data = startups[-c(49, 50), ])

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-0.37102 -0.02770  0.00135  0.05253  0.15813

```

```

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.102e+01  4.446e-02  247.986  <2e-16 ***
RD_Spend     7.198e-06  4.475e-07   16.084  <2e-16 ***
Marketing_Spend 8.046e-08  1.670e-07    0.482    0.632
State        5.088e-03  1.739e-02    0.293    0.771
---

```

```

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

Residual standard error: 0.09768 on 44 degrees of freedom
Multiple R-squared:  0.9223, Adjusted R-squared:  0.917
F-statistic: 174.1 on 3 and 44 DF, p-value: < 2.2e-16

```

```

> confint(startups_model_exp1,level = 0.95)
                2.5 %          97.5 %
(Intercept)  1.093500e+01 1.111419e+01
RD_Spend     6.295786e-06 8.099523e-06
Marketing_Spend -2.561294e-07 4.170542e-07
State        -2.994984e-02 4.012615e-02
> predict(startups_model_exp1,interval="predict")
      fit      lwr      upr
1 12.26795 12.05691 12.47898
2 12.23572 12.02379 12.44766
3 12.17202 11.96628 12.37775
4 12.10984 11.90357 12.31610
5 12.08708 11.88344 12.29071
6 12.01826 11.81337 12.22315
7 12.00888 11.79240 12.22535
8 11.99867 11.79671 12.20064

```

```

9 11.93256 11.72911 12.13601
10 11.94195 11.73711 12.14679
11 11.78675 11.58679 11.98670
12 11.77438 11.57147 11.97729
13 11.73047 11.53125 11.92970
14 11.71214 11.50972 11.91457
15 11.91872 11.71733 12.12012
16 11.88523 11.68201 12.08845
17 11.61247 11.40990 11.81503
18 11.74391 11.54161 11.94621
19 11.71888 11.51907 11.91869
20 11.66188 11.44452 11.87925
21 11.60257 11.39868 11.80645
22 11.62820 11.42465 11.83175
23 11.59177 11.39058 11.79296
24 11.54537 11.34338 11.74737
25 11.60571 11.40191 11.80951
26 11.50622 11.30337 11.70907
27 11.58775 11.38693 11.78857
28 11.58729 11.37976 11.79481
29 11.51970 11.31881 11.72058
30 11.52069 11.31602 11.72536
31 11.48832 11.28633 11.69031
32 11.48700 11.28157 11.69243
33 11.48979 11.28192 11.69765
34 11.45147 11.25173 11.65121
35 11.38081 11.17755 11.58406
36 11.38759 11.18376 11.59143
37 11.25727 11.05447 11.46006
38 11.36274 11.15960 11.56588
39 11.20037 10.99305 11.40770
40 11.32130 11.11805 11.52455
41 11.25055 11.04622 11.45489
42 11.24877 11.04695 11.45059
43 11.21175 11.00726 11.41625
44 11.15433 10.94622 11.36243
45 11.19159 10.98509 11.39810
46 11.04721 10.83662 11.25781
47 11.06815 10.85052 11.28577
48 11.02969 10.82102 11.23835

```

```

>
> startups_model_quad<-lm(Profit~RD_Spend+I(RD_Spend^2)+Administration+I(Admini
stration^2)+Marketing_Spend+I(Marketing_Spend^2)+State+I(State),data=startups[-
c(49,50),])
> summary(startups_model_quad)

```

```

Call:
lm(formula = Profit ~ RD_Spend + I(RD_Spend^2) + Administration +
    I(Administration^2) + Marketing_Spend + I(Marketing_Spend^2) +
    State + I(State), data = startups[-c(49, 50), ])

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-15009  -4452  -1134    4520   13825

```

```

Coefficients: (1 not defined because of singularities)
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   6.067e+04  1.742e+04   3.483  0.00121 **
RD_Spend       7.399e-01  1.184e-01   6.247  2.13e-07 ***
I(RD_Spend^2)  2.899e-07  7.985e-07   0.363  0.71845
Administration -1.073e-02  2.846e-01  -0.038  0.97012
I(Administration^2) -2.427e-07  1.187e-06  -0.204  0.83906
Marketing_Spend -5.273e-03  4.382e-02  -0.120  0.90483
I(Marketing_Spend^2)  5.126e-08  1.111e-07   0.462  0.64692
State          -4.829e+02  1.388e+03  -0.348  0.72979
I(State)                NA          NA      NA      NA

```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7564 on 40 degrees of freedom
Multiple R-squared: 0.9641, Adjusted R-squared: 0.9578
F-statistic: 153.3 on 7 and 40 DF, p-value: < 2.2e-16

> confint(startups_model_quad, level = 0.95)

	2.5 %	97.5 %
(Intercept)	2.546776e+04	9.587341e+04
RD_Spend	5.005001e-01	9.792565e-01
I(RD_Spend^2)	-1.323922e-06	1.903773e-06
Administration	-5.860217e-01	5.645661e-01
I(Administration^2)	-2.642054e-06	2.156690e-06
Marketing_Spend	-9.384529e-02	8.329890e-02
I(Marketing_Spend^2)	-1.732030e-07	2.757187e-07
State	-3.288479e+03	2.322766e+03
I(State)	NA	NA

> predict(startups_model_quad, interval = "predict")

	fit	lwr	upr
1	192391.41	174653.70	210129.12
2	188729.61	171056.62	206402.60
3	182869.92	166356.58	199383.26
4	172898.38	156689.77	189107.00
5	172636.22	156392.52	188879.91
6	163184.08	147073.20	179294.96
7	158365.80	140477.92	176253.68
8	157999.76	142054.38	173945.14
9	148992.74	132896.93	165088.55
10	154977.94	138914.66	171041.22
11	135448.08	119552.56	151343.60
12	136461.76	120339.23	152584.29
13	128289.17	112584.45	143993.89
14	126735.40	110806.67	142664.13
15	147012.47	130616.12	163408.81
16	144926.14	128684.16	161168.11
17	116967.56	100955.02	132980.09
18	127793.08	111800.65	143785.50
19	128543.27	112762.23	144324.32
20	117961.28	100268.04	135654.53
21	116921.32	100625.88	133216.76
22	114638.62	98192.90	131084.34
23	114179.86	98148.17	130211.55
24	110298.44	94175.20	126421.67
25	114760.64	98466.92	131054.37
26	103268.84	87369.09	119168.58
27	110710.40	94966.34	126454.47
28	113272.36	96226.14	130318.58
29	99877.21	81707.60	118046.83
30	101708.33	85632.26	117784.40
31	102146.71	86138.98	118154.45
32	98175.87	82086.33	114265.40
33	102695.63	85913.86	119477.40
34	99202.96	83498.98	114906.93
35	88601.79	72090.18	105113.39
36	92294.21	76126.82	108461.59
37	76882.95	60742.75	93023.15
38	93119.69	74145.93	112093.46
39	73327.56	55899.73	90755.39
40	87233.00	71167.63	103298.37
41	77639.24	61523.39	93755.09
42	78436.85	62448.89	94424.80
43	74906.20	58827.57	90984.83
44	65337.06	48821.11	81853.01
45	69154.30	52533.42	85775.17
46	54879.91	37615.51	72144.31
47	59139.15	41399.58	76878.71

48 54283.99 37026.65 71541.34

```
>
> startups_model_quad1<-lm(Profit~RD_Spend+I(RD_Spend^2)+Administration+I(Admin
istration^2),data=startups[-c(49,50),])
> summary(startups_model_quad1)
```

```
Call:
lm(formula = Profit ~ RD_Spend + I(RD_Spend^2) + Administration +
    I(Administration^2), data = startups[-c(49, 50), ])
```

Residuals:

Min	1Q	Median	3Q	Max
-16533	-5443	-1703	4262	14144

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.942e+04	1.612e+04	3.687	0.000631 ***
RD_Spend	7.160e-01	8.579e-02	8.346	1.54e-10 ***
I(RD_Spend^2)	6.531e-07	5.088e-07	1.284	0.206165
Administration	2.530e-02	2.737e-01	0.092	0.926776
I(Administration^2)	-4.420e-07	1.143e-06	-0.387	0.701009

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7404 on 43 degrees of freedom

Multiple R-squared: 0.963, Adjusted R-squared: 0.9595

F-statistic: 279.6 on 4 and 43 DF, p-value: < 2.2e-16

```
> confint(startups_model_quad1,level = 0.95)
```

	2.5 %	97.5 %
(Intercept)	2.692362e+04	9.192256e+04
RD_Spend	5.430177e-01	8.890472e-01
I(RD_Spend^2)	-3.730436e-07	1.679328e-06
Administration	-5.267363e-01	5.773460e-01
I(Administration^2)	-2.748056e-06	1.864066e-06

```
> predict(startups_model_quad1,interval = "predict")
```

	fit	lwr	upr
1	190856.37	174240.38	207472.36
2	186818.29	170183.44	203453.14
3	182707.64	166627.02	198788.26
4	173190.47	157533.42	188847.53
5	172987.34	157142.78	188831.90
6	163332.57	147803.48	178861.66
7	161795.84	146310.33	177281.36
8	158131.17	142730.61	173531.74
9	149213.49	133854.31	164572.68
10	155199.77	139813.18	170586.36
11	136572.38	121228.12	151916.63
12	136725.68	121236.03	152215.34
13	128443.90	113153.98	143733.82
14	126134.04	110863.90	141404.18
15	147832.09	132282.32	163381.86
16	146449.55	131154.73	161744.38
17	115799.75	100479.57	131119.92
18	127421.10	112127.82	142714.38
19	127743.86	112403.26	143084.46
20	119648.64	104218.31	135078.98
21	114971.71	99630.34	130313.09
22	113005.68	97565.83	128445.52
23	112425.33	97111.13	127739.54
24	108490.38	93144.70	123836.06
25	116621.66	101230.31	132013.01
26	103379.73	88102.19	118657.27
27	111532.03	96232.27	126831.80
28	110459.75	95162.97	125756.54
29	99444.79	81723.43	117166.14

```

30 102731.38 87309.88 118152.87
31 103338.91 88022.72 118655.09
32 99197.66 83783.63 114611.69
33 103341.55 88056.23 118626.87
34 99083.45 83760.77 114406.14
35 87072.60 71491.08 102654.12
36 92708.65 77232.12 108185.17
37 76563.79 61154.01 91973.57
38 92382.39 74085.86 110678.93
39 73921.93 57337.49 90506.37
40 87059.56 71531.76 102587.36
41 77340.51 61933.04 92747.98
42 78875.36 63324.96 94425.75
43 75060.33 59584.26 90536.40
44 66734.20 51044.35 82424.05
45 68949.29 53167.18 84731.39
46 56468.72 40166.52 72770.91
47 57368.19 41110.05 73626.33
48 54743.66 38341.55 71145.77

```

```

>
> startups_model_poly <- lm(Profit~RD_Spend+I(RD_Spend^2)+I(RD_Spend^3)+
+Administration+I(Administration^2)+I(Administration^3)+
+Marketing_Spend+I(Marketing_Spend^2)+I(Marketing_Spend^3)+
+State+I(State^2)+I(State^3),data=startups[-c(49,50),])
> summary(startups_model_poly)

```

Call:

```

lm(formula = Profit ~ RD_Spend + I(RD_Spend^2) + I(RD_Spend^3) +
    Administration + I(Administration^2) + I(Administration^3) +
    Marketing_Spend + I(Marketing_Spend^2) + I(Marketing_Spend^3) +
    State + I(State^2) + I(State^3), data = startups[-c(49, 50),
    ])

```

Residuals:

```

      Min       1Q   Median       3Q      Max
-14811  -4320  -1841    4371   14941

```

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3.338e+04	4.270e+04	0.782	0.439461
RD_Spend	1.321e+00	3.667e-01	3.603	0.000942 ***
I(RD_Spend^2)	-1.007e-05	6.258e-06	-1.610	0.116160
I(RD_Spend^3)	4.834e-11	2.915e-11	1.658	0.105936
Administration	5.050e-01	1.199e+00	0.421	0.676221
I(Administration^2)	-3.802e-06	1.059e-05	-0.359	0.721689
I(Administration^3)	7.862e-12	3.022e-11	0.260	0.796195
Marketing_Spend	-9.678e-02	1.097e-01	-0.883	0.383326
I(Marketing_Spend^2)	7.294e-07	6.585e-07	1.108	0.275351
I(Marketing_Spend^3)	-1.304e-12	1.129e-12	-1.155	0.255534
State	-2.194e+03	1.036e+04	-0.212	0.833431
I(State^2)	6.219e+02	2.574e+03	0.242	0.810420
I(State^3)	NA	NA	NA	NA

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7641 on 36 degrees of freedom

Multiple R-squared: 0.967, Adjusted R-squared: 0.9569

F-statistic: 95.87 on 11 and 36 DF, p-value: < 2.2e-16

```

> confint(startups_model_poly,level = 0.95)

```

	2.5 %	97.5 %
(Intercept)	-5.321296e+04	1.199698e+05
RD_Spend	5.777300e-01	2.065265e+00
I(RD_Spend^2)	-2.276479e-05	2.617010e-06
I(RD_Spend^3)	-1.077798e-11	1.074601e-10
Administration	-1.927591e+00	2.937664e+00
I(Administration^2)	-2.527986e-05	1.767600e-05


```

I(Administration^3) -5.342104e-11 6.914585e-11
Marketing_Spend -3.191843e-01 1.256190e-01
I(Marketing_Spend^2) -6.060811e-07 2.064838e-06
I(Marketing_Spend^3) -3.593796e-12 9.851555e-13
State -2.320300e+04 1.881430e+04
I(State^2) -4.597634e+03 5.841484e+03
I(State^3) NA NA

```

```
> predict(startups_model_poly, interval="predict")
```

	fit	lwr	upr
1	191789.77	171886.92	211692.61
2	191426.84	173152.57	209701.11
3	185382.37	167907.73	202857.01
4	174828.47	158014.12	191642.82
5	173285.19	156094.65	190475.73
6	161290.33	144386.51	178194.14
7	158929.85	140626.43	177233.27
8	157634.66	140760.56	174508.77
9	148062.80	131337.97	164787.62
10	153646.03	136861.59	170430.47
11	133109.47	116535.42	149683.51
12	133478.11	116284.99	150671.22
13	126644.54	110305.56	142983.52
14	125015.30	108559.78	141470.82
15	145674.01	128652.87	162695.14
16	144728.24	128041.03	161415.44
17	117164.34	100776.68	133552.01
18	126937.58	110438.17	143436.98
19	126500.03	110104.27	142895.80
20	118936.99	100372.80	137501.18
21	116660.09	99921.68	133398.50
22	115111.08	98176.56	132045.61
23	114286.15	97679.72	130892.57
24	111183.60	94442.60	127924.61
25	114061.85	96894.12	131229.58
26	103117.67	86570.83	119664.51
27	108866.68	91799.62	125933.74
28	111618.21	94122.21	129114.21
29	98657.73	77624.63	119690.84
30	102208.16	85571.26	118845.06
31	102173.23	85129.16	119217.30
32	99283.32	82691.61	115875.02
33	103123.89	86071.22	120176.55
34	102255.80	85659.38	118852.21
35	92002.61	74683.71	109321.50
36	96463.78	79207.18	113720.38
37	80564.46	63244.22	97884.69
38	90847.51	70059.78	111635.24
39	73239.84	55474.93	91004.75
40	89186.16	72489.34	105882.98
41	80489.03	63676.33	97301.73
42	79837.60	63119.55	96555.65
43	75879.67	59090.55	92668.78
44	66957.75	50085.53	83829.97
45	70738.50	53661.56	87815.43
46	52668.02	34769.70	70566.33
47	54328.88	35452.99	73204.77
48	50001.00	31639.06	68362.93

```

>
> startups_model_poly1<- lm(Profit~RD_Spend+I(RD_Spend^2)+I(RD_Spend^3)+
+ Administration+I(Administration^2)+I(Administration^3),data=startups[,-c(49,50),])
> summary(startups_model_poly1)

```

```

Call:
lm(formula = Profit ~ RD_Spend + I(RD_Spend^2) + I(RD_Spend^3) +
    Administration + I(Administration^2) + I(Administration^3),

```



```

data = startups[-c(49, 50), ]

Residuals:
    Min       1Q   Median       3Q      Max
-14475  -4665  -1458   4368  14182

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   4.135e+04  3.995e+04   1.035   0.307
RD_Spend       1.018e+00  2.034e-01   5.003 1.11e-05 ***
I(RD_Spend^2)  -4.182e-06  2.994e-06  -1.397   0.170
I(RD_Spend^3)   2.003e-11  1.220e-11   1.642   0.108
Administration  3.545e-01  1.089e+00   0.325   0.747
I(Administration^2) -2.792e-06  9.631e-06  -0.290   0.773
I(Administration^3)  5.293e-12  2.751e-11   0.192   0.848
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7341 on 41 degrees of freedom
Multiple R-squared:  0.9653, Adjusted R-squared:  0.9602
F-statistic: 190.1 on 6 and 41 DF, p-value: < 2.2e-16

> confint(startups_model_poly1, level = 0.95)
              2.5 %          97.5 %
(Intercept) -3.931818e+04 1.220253e+05
RD_Spend      6.069008e-01 1.428421e+00
I(RD_Spend^2) -1.022856e-05 1.863791e-06
I(RD_Spend^3) -4.611827e-12 4.467352e-11
Administration -1.845682e+00 2.554781e+00
I(Administration^2) -2.224237e-05 1.665916e-05
I(Administration^3) -5.025625e-11 6.084134e-11
> predict(startups_model_poly1, interval="predict")
      fit      lwr      upr
1  195626.83 178026.04 213227.61
2  190416.53 173267.54 207565.53
3  184176.94 168013.96 200339.92
4  172983.76 157435.07 188532.45
5  172119.97 156160.09 188079.84
6  161602.82 145889.54 177316.11
7  160001.97 144428.37 175575.58
8  156044.07 140494.68 171593.45
9  146731.73 131148.63 162314.82
10 153180.09 137644.00 168716.18
11 135055.68 119675.39 150435.97
12 134969.82 119261.27 150678.37
13 127403.15 112144.22 142662.07
14 125125.00 109844.40 140405.60
15 145204.61 129435.55 160973.68
16 144391.68 128998.24 159785.12
17 116152.20 100925.93 131378.46
18 126038.84 110688.13 141389.55
19 126953.49 111683.72 142223.26
20 118779.28 103393.44 134165.12
21 115506.60 100257.00 130756.21
22 112829.71  97464.99 128194.43
23 113114.82  97870.52 128359.12
24 109707.63  94361.00 125054.26
25 116956.13 101572.08 132340.18
26 104583.74  89225.55 119941.93
27 111797.81  96499.97 127095.64
28 111255.84  95989.90 126521.79
29  99974.79  80067.58 119882.00
30 103621.46  88221.14 119021.79
31 104994.74  89653.71 120335.77
32 100405.71  84974.51 115836.90
33 104793.96  89451.22 120136.71
34 101053.61  85600.77 116506.46

```

```

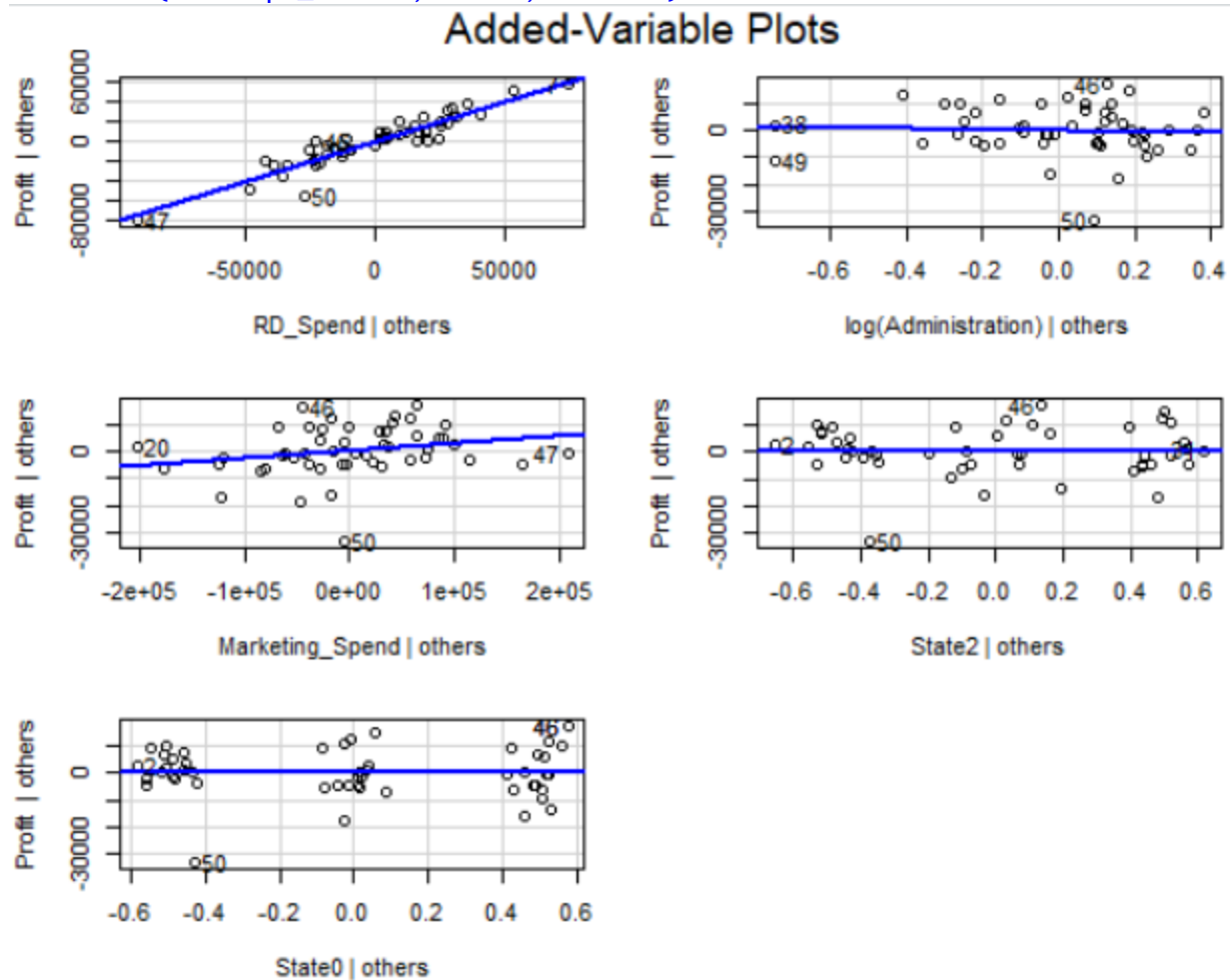
35 88834.12 73203.77 104464.46
36 94493.81 78867.06 110120.57
37 78396.60 62899.09 93894.12
38 91347.85 71692.23 111003.47
39 73153.41 56643.15 89663.67
40 88745.61 73091.20 104400.02
41 79250.55 63775.09 94726.01
42 80138.89 64489.73 95788.05
43 76324.29 60744.63 91903.94
44 67007.65 51410.72 82604.58
45 69705.07 53992.80 85417.34
46 53484.25 36890.18 70078.31
47 54524.64 37969.73 71079.55
48 51315.38 34494.78 68135.98

```

```
> vif(startups_model1)
```

	GVIF	Df	GVIF^(1/(2*Df))
RD_Spend	2.464641	1	1.569917
log(Administration)	1.163435	1	1.078627
Marketing_Spend	2.352276	1	1.533713
State	1.065861	2	1.016073

```
> avPlots(startups_model1,id.n=2,id.cex=3)
```



Conclusion- p-value is less than 0.05. and Multiple R- squared value is 0.967. This means the regression model will predict the output 96.7% time correct

Problem statement 2

Predict Price of the computer

Answer:

Rcode:

```
computer <- read.csv(file.choose())
attach(computer)
View(computer)
summary(computer)
library(plyr)
computer$cd <- as.numeric(revalue(computer$cd, c("yes"=1, "no"=0)))
computer$multi <- as.numeric(revalue(computer$multi, c("yes"=1, "no"=0)))
computer$premium <- as.numeric(revalue(computer$premium, c("yes"=1,
"no"=0)))
View(computer)
var(computer$cd)
qqnorm(price)
qqline(price)
qqnorm(speed)
qqline(speed)
qqnorm(hd)
qqline(hd)
qqnorm(ram)
qqline(ram)
qqnorm(screen)
qqnorm(ads)
boxplot(price, horizontal = TRUE)
boxplot(speed)
```

```
boxplot(hd)
boxplot(ram)
boxplot(screen)
boxplot(ads)
hist(price)
hist(speed)
hist(hd)
hist(ram)
hist(screen)
hist(ads)
boxplot(price)
boxplot(price)$out
boxplot(price,plot = FALSE)$out
outliers<-boxplot(price,plot = FALSE)$out
print(outliers)
computer[which(price %in% outliers),]
computer <-computer[-which(price %in% outliers),]
boxplot(price)
```

```
boxplot(hd)$out
boxplot(hd,plot = FALSE)$out
outliers<-boxplot(hd,plot = FALSE)$out
print(outliers)
computer[which(hd %in% outliers),]
computer <-computer[-which(hd %in% outliers),]
```

```
boxplot(ram)$out
```

```
boxplot(ram,plot = FALSE)$out
outliers<-boxplot(ram,plot = FALSE)$out
print(outliers)
computer[which(ram %in% outliers),]
computer <-computer[-which(ram %in% outliers),]
pairs(computer)
plot(price)
plot(speed)
plot(hd)
plot(ram)
plot(screen)
plot(cd)
plot(multi)
plot(premium)
plot(ads)
plot(trend)

cor(computer)
library(corpcor)
cor2pcor(cor(computer))
computer_model<-
lm(price~speed+hd+ram+screen+trend+multi+ads+premium+cd)
summary(computer_model)
confint(computer_model,level = 0.95)
predict(computer_model,interval="predict")

library(mvinfluence)
```

```

library(car)

influence.measures(computer_model)

influenceIndexPlot(computer_model, id.n=3)

influencePlot(computer_model,id.n=3)


computer_model1<-
lm(price~log(speed)+log(hd)+log(ram)+log(screen)+log(trend)+log(multi)+log(ads)+log(premium)+log(cd),data = computer[-c(1441,1701),])

summary(computer_model1)

confint(computer_model1,level = 0.95)

predict(computer_model1,interval="predict")

plot(computer_model1)

computer_model2<-
lm(price~log(speed)+log(hd)+log(ram)+screen+trend+multi+ads+premium+cd,data = computer[-c(1441,1701),])

summary(computer_model2)

confint(computer_model2,level = 0.95)

predict(computer_model2,interval="predict")


computer_model_exp<-
lm(log(price)~speed+hd+ram+screen+trend+multi+ads+premium+cd)

summary(computer_model_exp)

confint(computer_model_exp,level = 0.95)

predict(computer_model_exp,interval="predict")


computer_model_quad<-
lm(price~speed+I(speed^2)+hd+I(hd^2)+ram+I(ram^2)+screen+I(screen^2)+ads+I(ads^2)+trend+I(trend))

summary(computer_model_quad)

```

```

confint(computer_model_quad,level = 0.95)
predict(computer_model_quad,interval="predict")
avPlots(computer_model1)
pairs(computer)
influencePlot(computer_model2)
vif(computer2)
vif(computer)

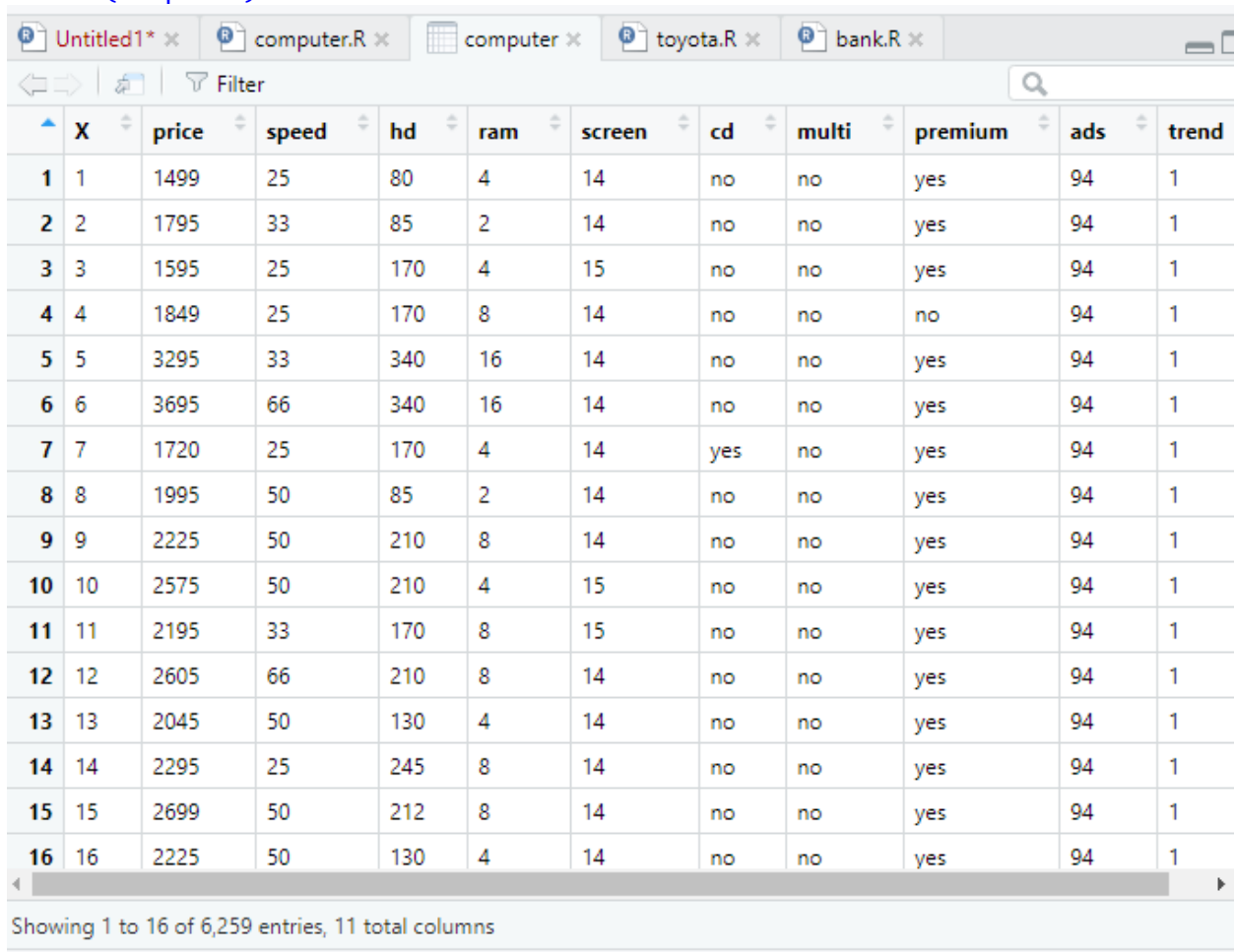
```

Console:

```

> computer <- read.csv(file.choose())
> attach(computer)
> View(computer)

```



	X	price	speed	hd	ram	screen	cd	multi	premium	ads	trend
1	1	1499	25	80	4	14	no	no	yes	94	1
2	2	1795	33	85	2	14	no	no	yes	94	1
3	3	1595	25	170	4	15	no	no	yes	94	1
4	4	1849	25	170	8	14	no	no	no	94	1
5	5	3295	33	340	16	14	no	no	yes	94	1
6	6	3695	66	340	16	14	no	no	yes	94	1
7	7	1720	25	170	4	14	yes	no	yes	94	1
8	8	1995	50	85	2	14	no	no	yes	94	1
9	9	2225	50	210	8	14	no	no	yes	94	1
10	10	2575	50	210	4	15	no	no	yes	94	1
11	11	2195	33	170	8	15	no	no	yes	94	1
12	12	2605	66	210	8	14	no	no	yes	94	1
13	13	2045	50	130	4	14	no	no	yes	94	1
14	14	2295	25	245	8	14	no	no	yes	94	1
15	15	2699	50	212	8	14	no	no	yes	94	1
16	16	2225	50	130	4	14	no	no	yes	94	1

Showing 1 to 16 of 6,259 entries, 11 total columns

```

> summary(computer)
      X      price      speed      hd
Min.   : 1    Min.   : 949    Min.   : 25.00    Min.   : 80.0
1st Qu.:1566  1st Qu.:1794    1st Qu.: 33.00    1st Qu.: 214.0

```

```

Median :3130   Median :2144   Median : 50.00   Median : 340.0
Mean    :3130   Mean    :2220   Mean    : 52.01   Mean    : 416.6
3rd Qu.:4694   3rd Qu.:2595   3rd Qu.: 66.00   3rd Qu.: 528.0
Max.    :6259   Max.    :5399   Max.    :100.00   Max.    :2100.0

   ram          screen          cd          multi          premium
Min.   : 2.000   Min.   :14.00   no :3351   no :5386   no : 612
1st Qu.: 4.000   1st Qu.:14.00   yes:2908   yes: 873   yes:5647
Median : 8.000   Median :14.00
Mean   : 8.287   Mean   :14.61
3rd Qu.: 8.000   3rd Qu.:15.00
Max.   :32.000   Max.   :17.00

   ads          trend
Min.   : 39.0   Min.   : 1.00
1st Qu.:162.5   1st Qu.:10.00
Median :246.0   Median :16.00
Mean   :221.3   Mean   :15.93
3rd Qu.:275.0   3rd Qu.:21.50
Max.   :339.0   Max.   :35.00

```

```

> library(plyr)
> computer$cd <- as.numeric(revalue(computer$cd,c("yes"=1, "no"=0)))
> computer$multi <- as.numeric(revalue(computer$multi,c("yes"=1, "no"=0)))
> computer$premium <- as.numeric(revalue(computer$premium,c("yes"=1, "no"=0)))
> View(computer)

```

	X	price	speed	hd	ram	screen	cd	multi	premium	ads	trend
1	1	1499	25	80	4	14	1	1	2	94	1
2	2	1795	33	85	2	14	1	1	2	94	1
3	3	1595	25	170	4	15	1	1	2	94	1
4	4	1849	25	170	8	14	1	1	1	94	1
5	5	3295	33	340	16	14	1	1	2	94	1
6	6	3695	66	340	16	14	1	1	2	94	1
7	7	1720	25	170	4	14	2	1	2	94	1
8	8	1995	50	85	2	14	1	1	2	94	1
9	9	2225	50	210	8	14	1	1	2	94	1
10	10	2575	50	210	4	15	1	1	2	94	1
11	11	2195	33	170	8	15	1	1	2	94	1
12	12	2605	66	210	8	14	1	1	2	94	1
13	13	2045	50	130	4	14	1	1	2	94	1
14	14	2295	25	245	8	14	1	1	2	94	1
15	15	2699	50	212	8	14	1	1	2	94	1
16	16	2225	50	130	4	14	1	1	2	94	1

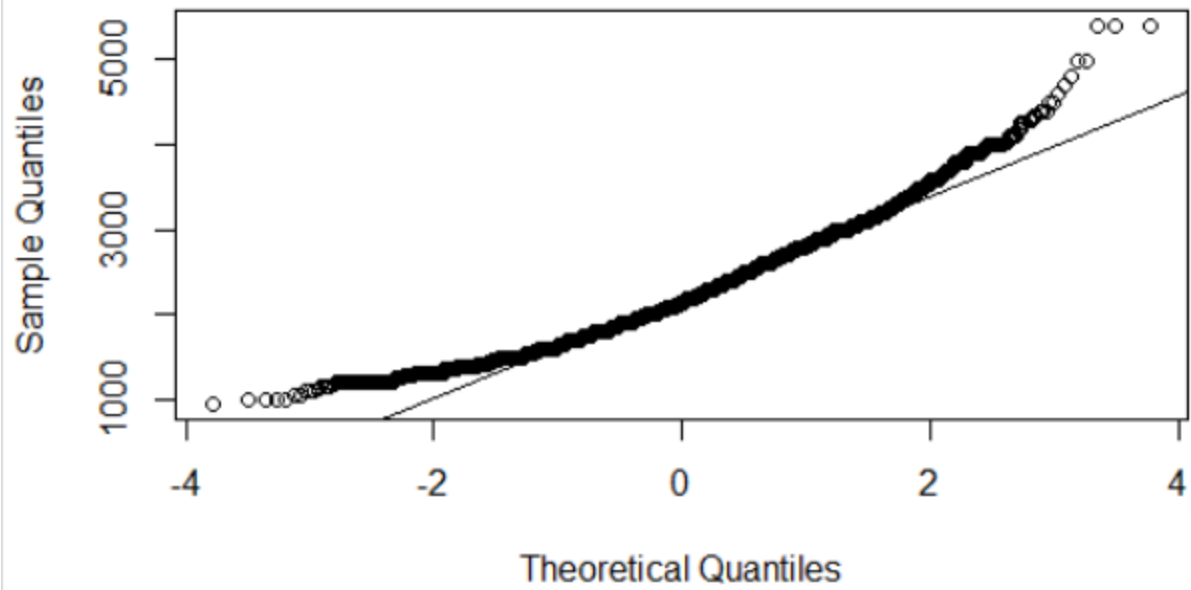
Showing 1 to 16 of 6,259 entries, 11 total columns

```

> var(computer$cd)
[1] 0.2487874
> qqnorm(price)
> qqline(price)

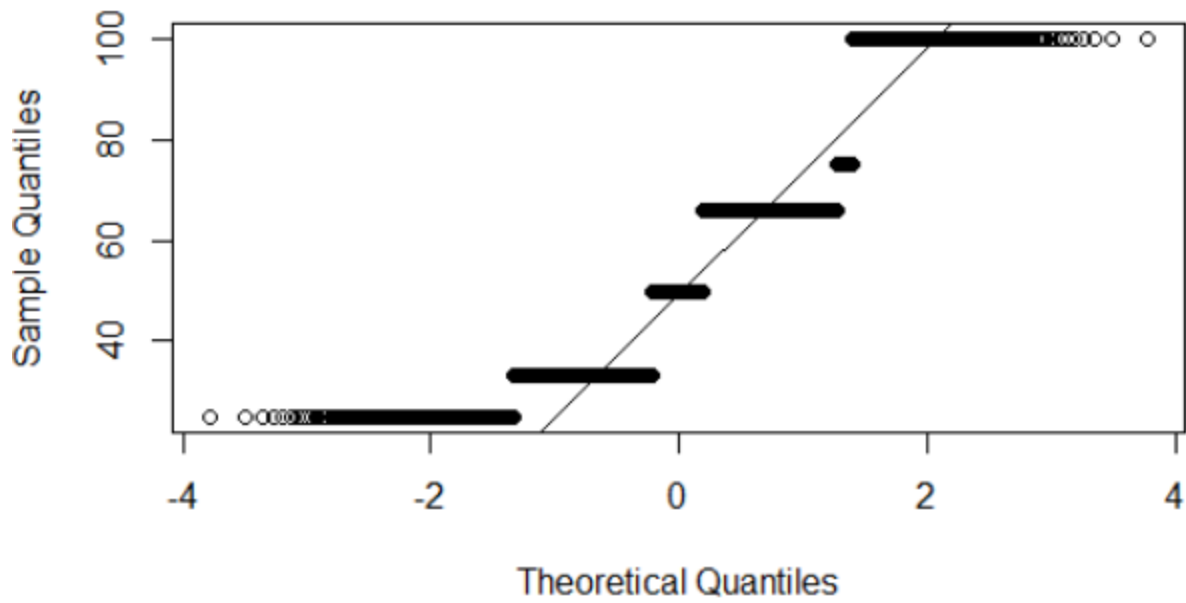
```


Normal Q-Q Plot



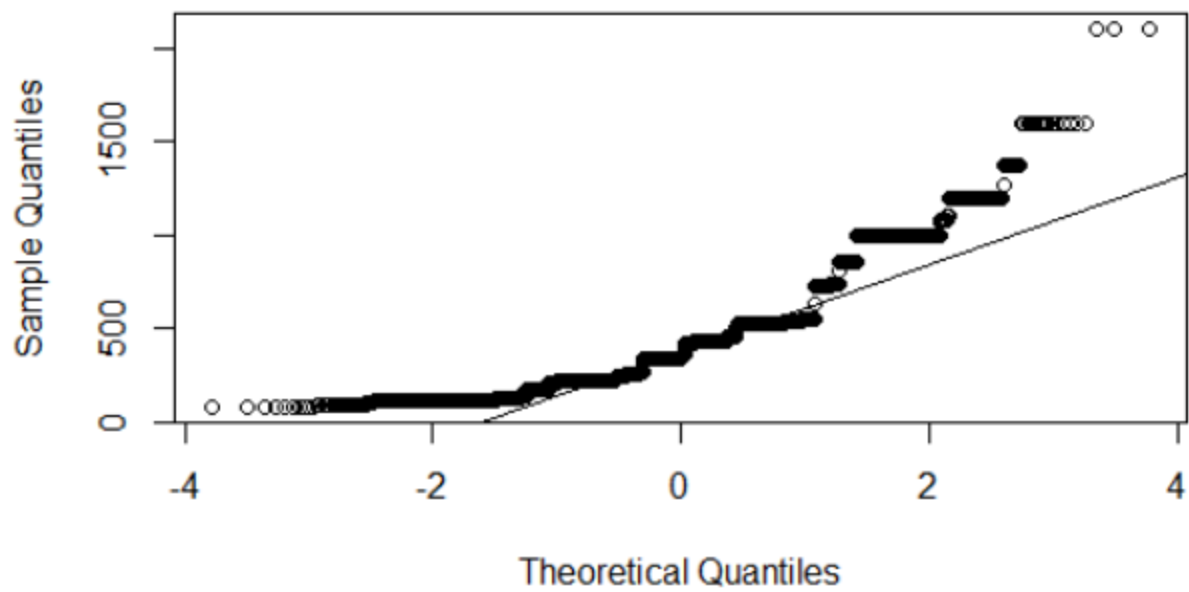
```
> qqnorm(speed)  
> qqline(speed)
```

Normal Q-Q Plot



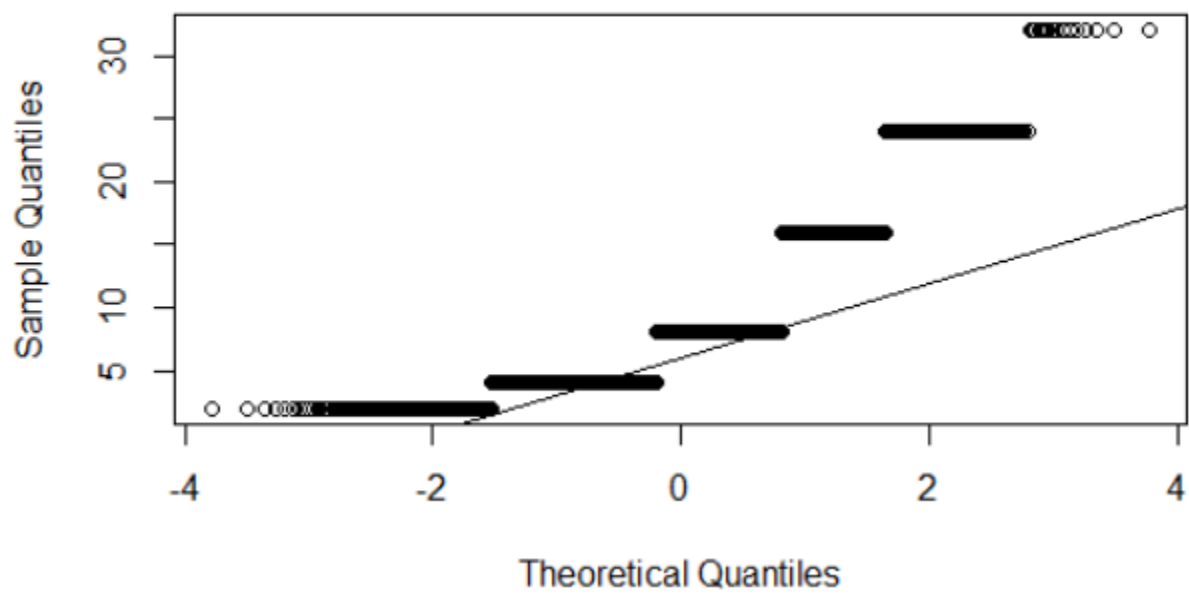
```
> qqnorm(hd)  
> qqline(hd)
```

Normal Q-Q Plot



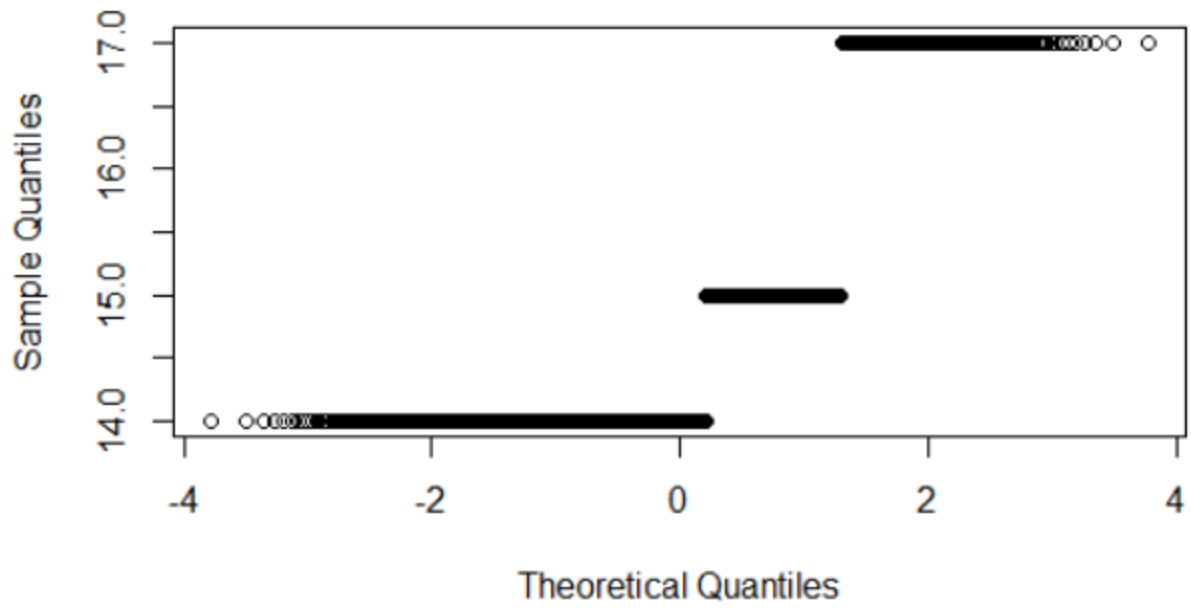
```
> qqnorm(ram)
> qqline(ram)
```

Normal Q-Q Plot



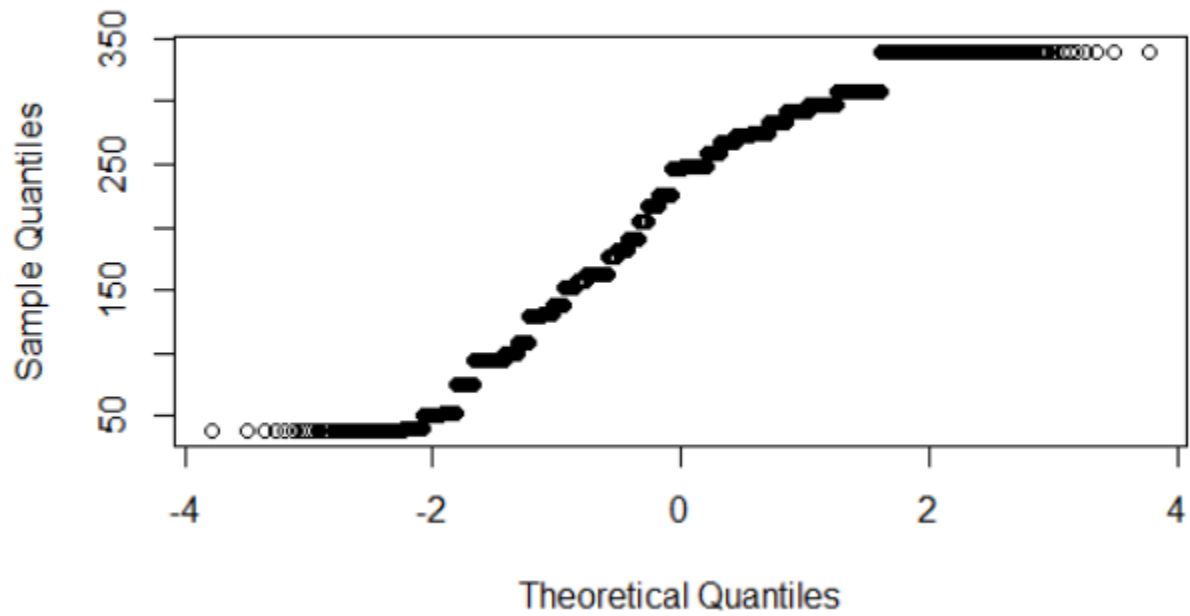
```
> qqnorm(screen)
```

Normal Q-Q Plot

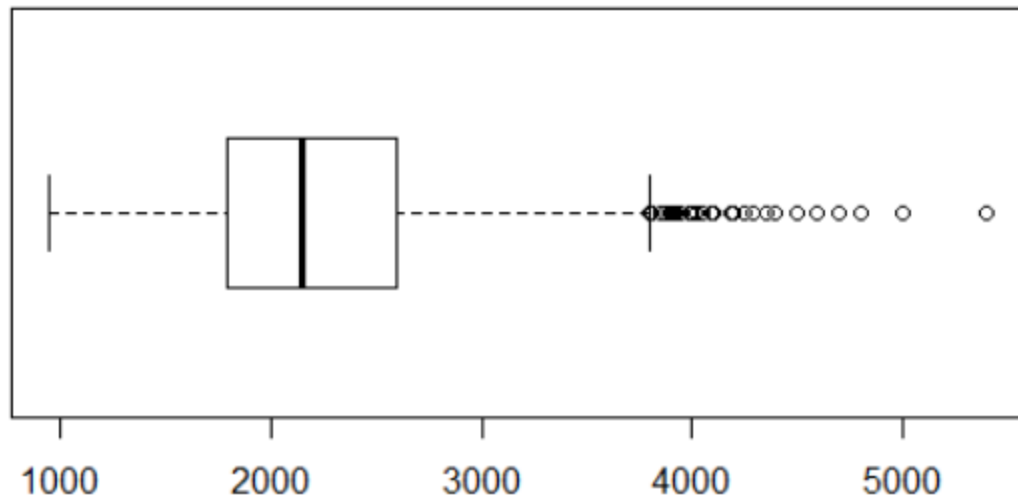


```
> qqnorm(ads)
```

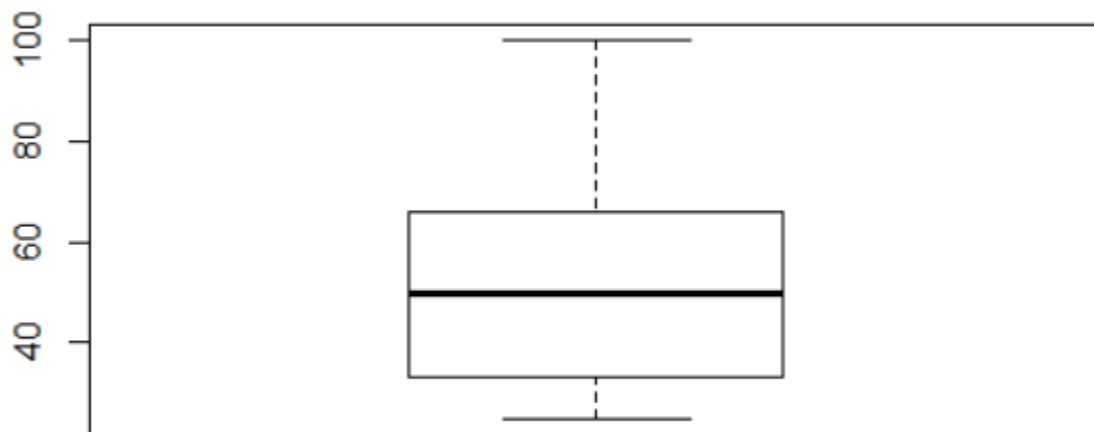
Normal Q-Q Plot



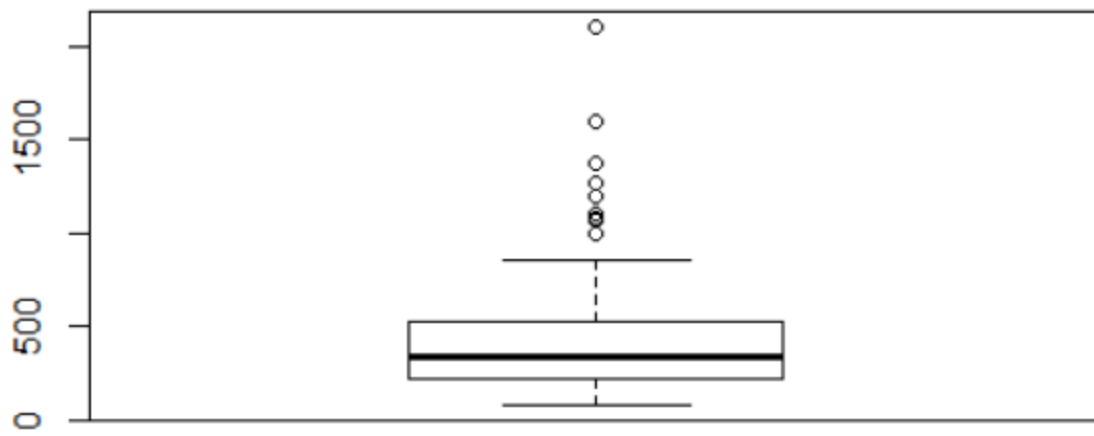
```
> boxplot(price, horizontal = TRUE)
```



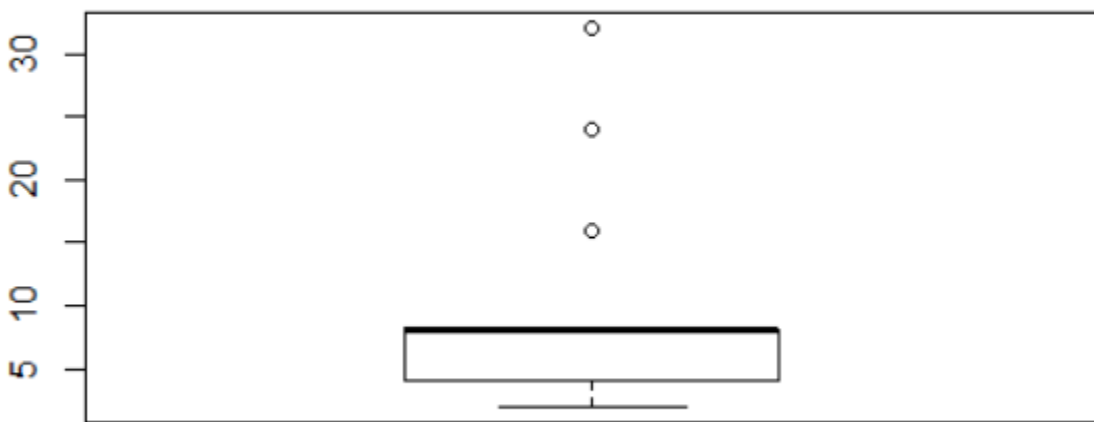
```
> boxplot(speed)
```



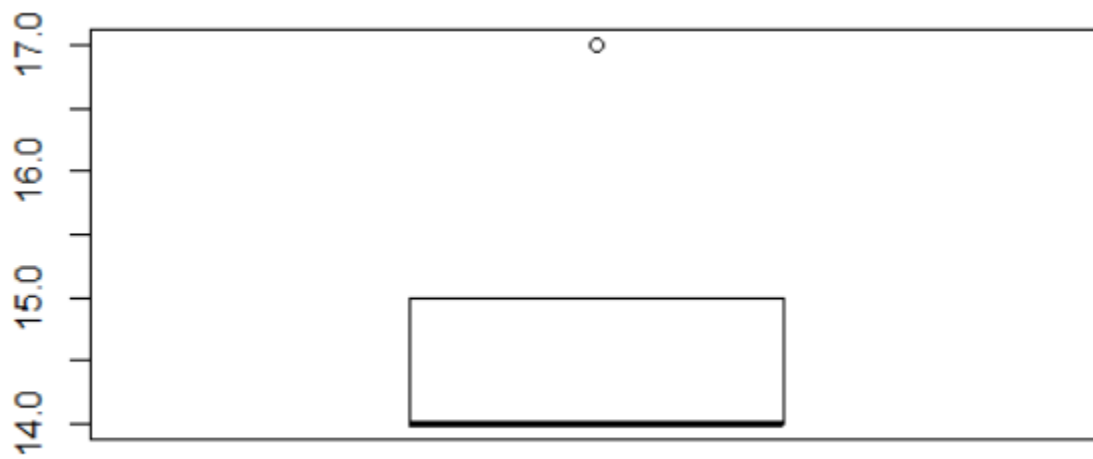
```
> boxplot(hd)
```



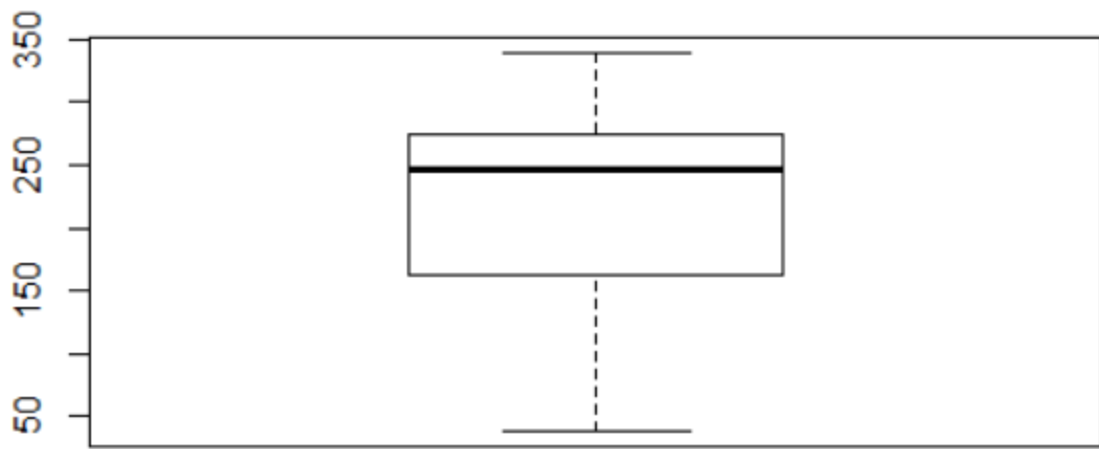
```
> boxplot(ram)
```



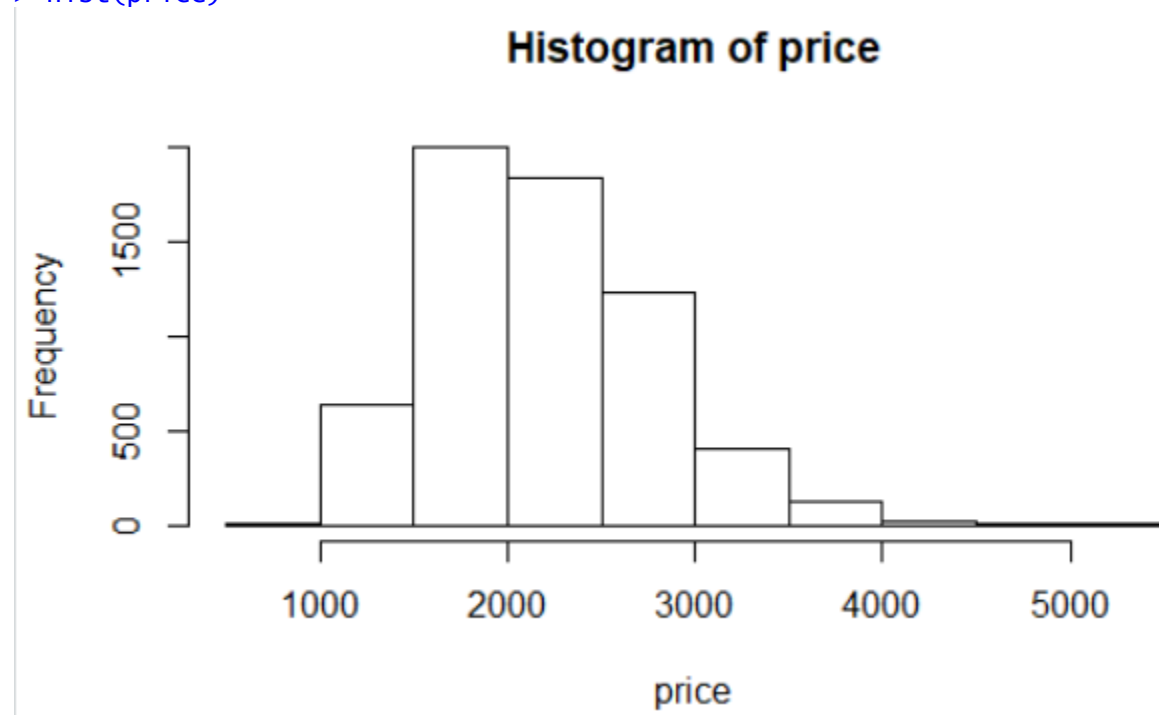
```
> boxplot(screen)
```



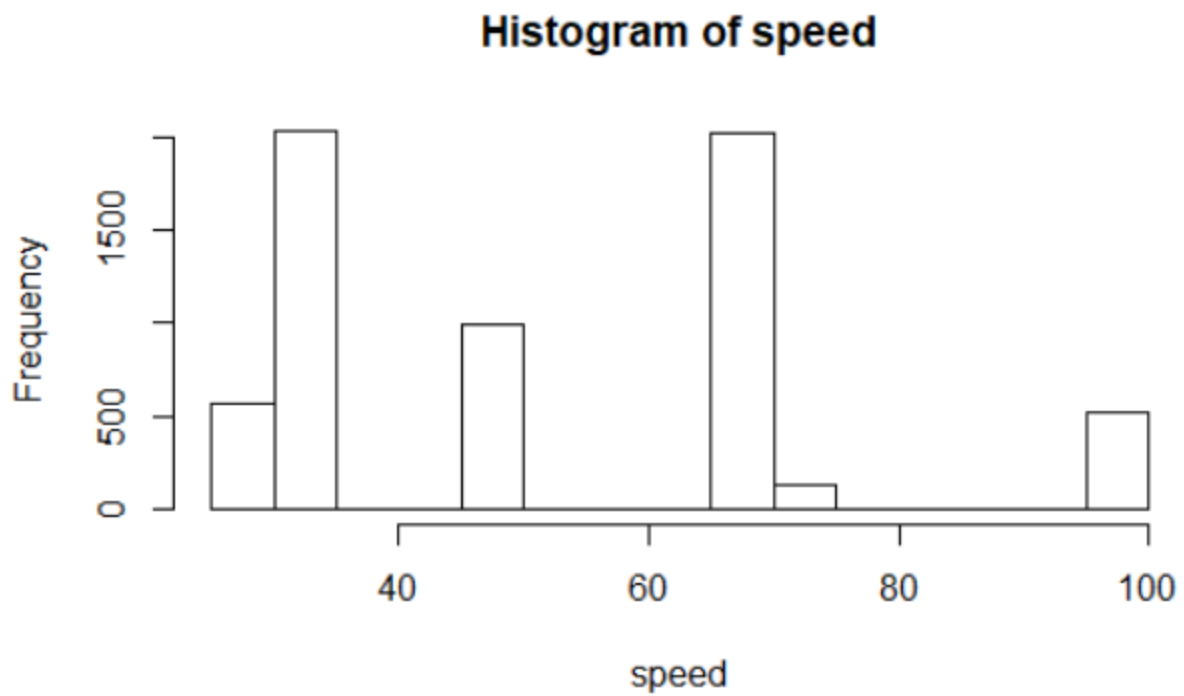
```
> boxplot(ads)
```



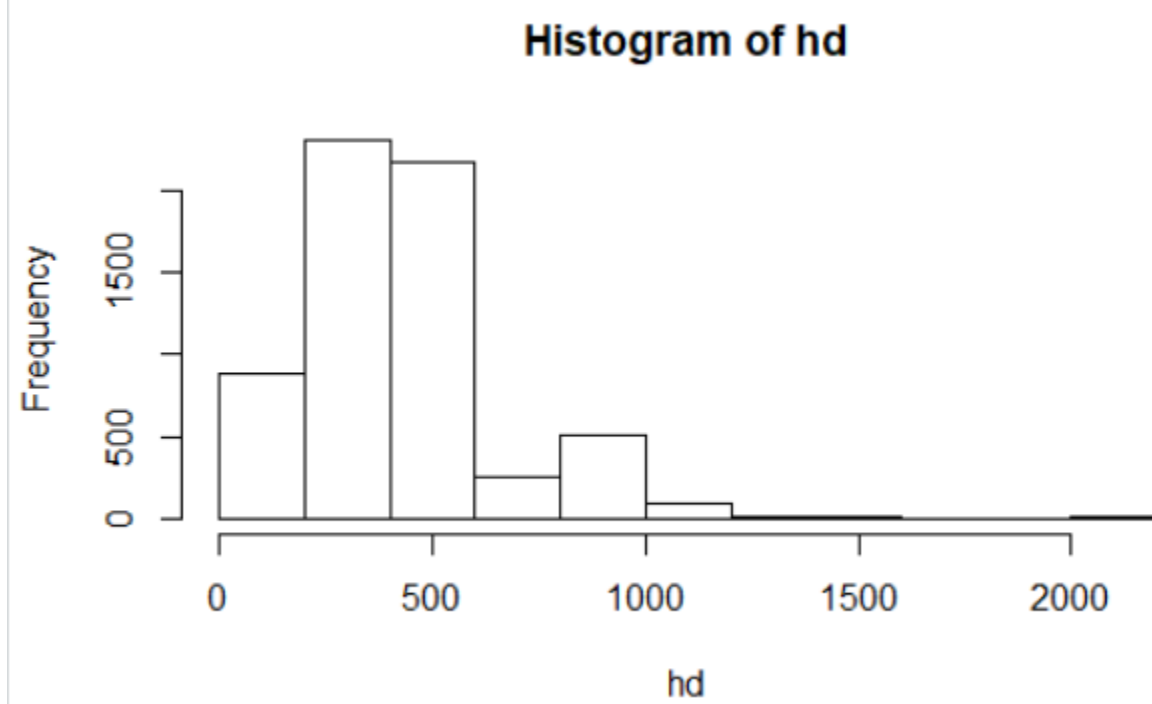
```
> hist(price)
```



```
> hist(speed)
```

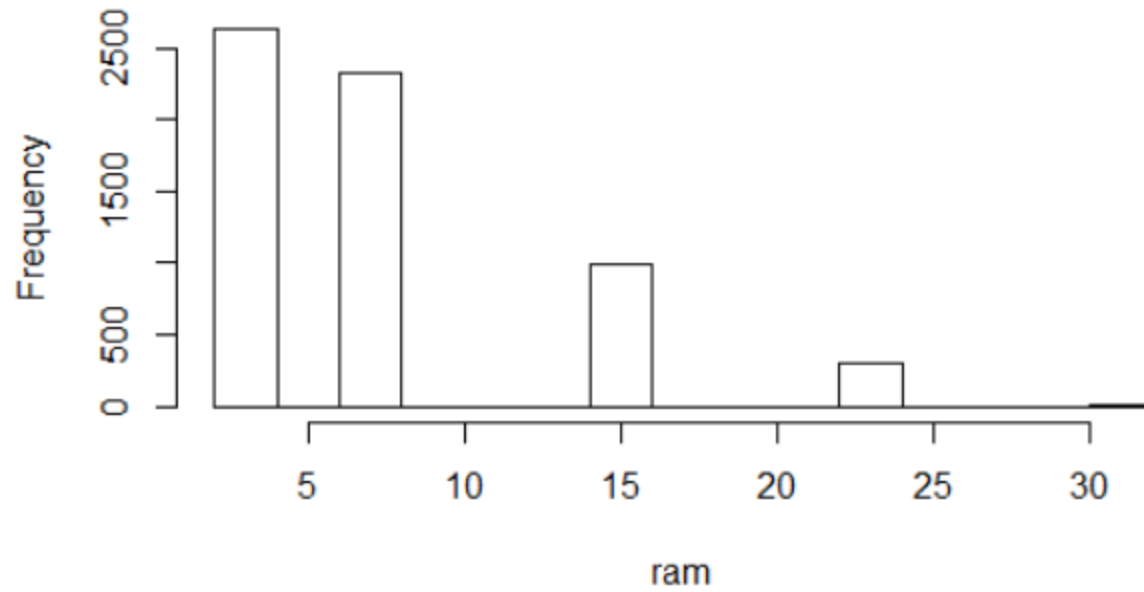


```
> hist(hd)
```



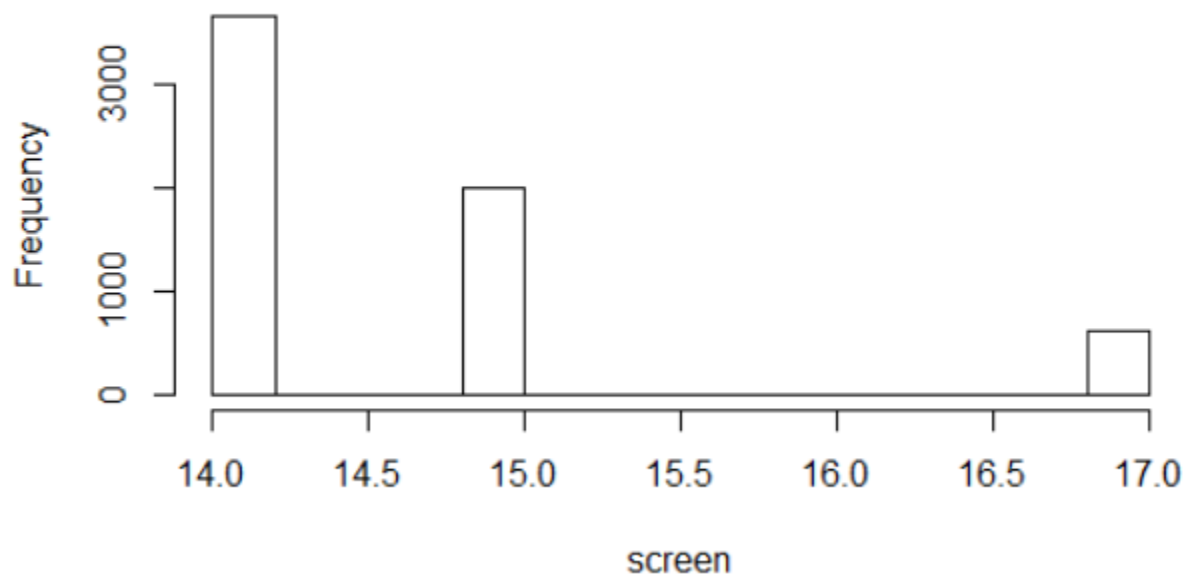
```
> hist(ram)
```

Histogram of ram

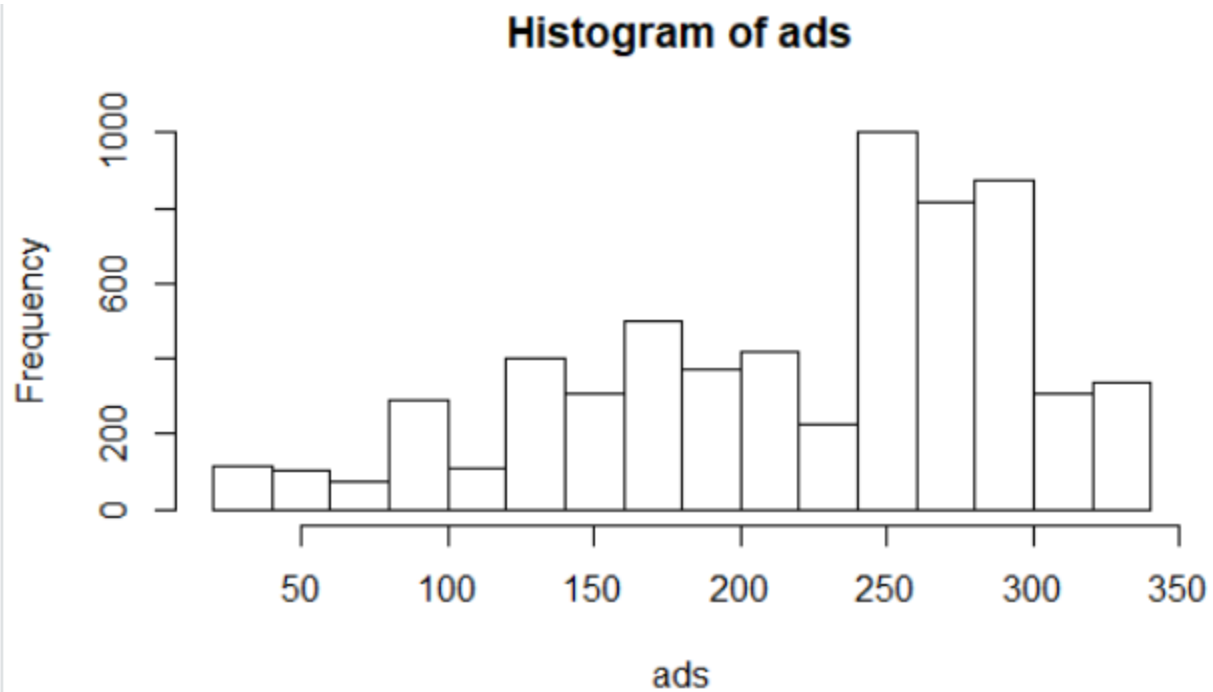


> hist(screen)

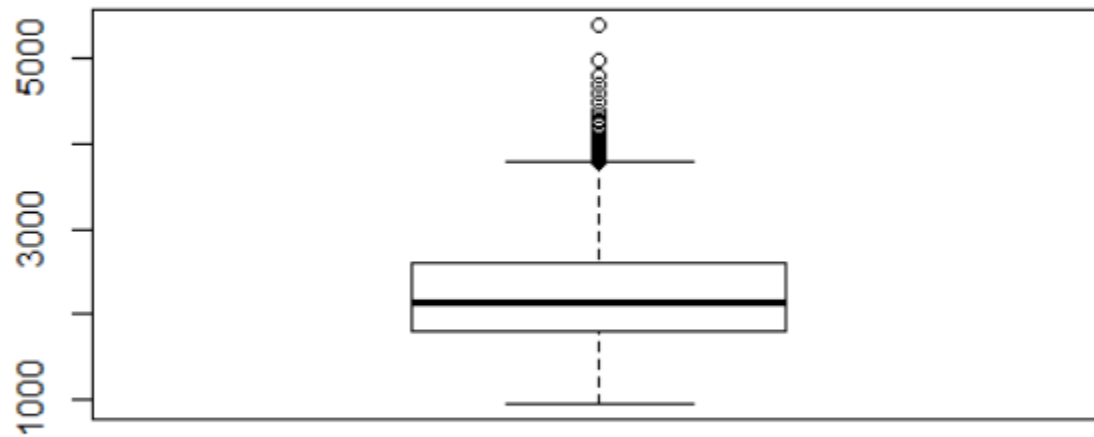
Histogram of screen



> hist(ads)



```
> boxplot(price)
```



```
> boxplot(price)$out
 [1] 4395 4195 3995 3895 3990 4020 3895 4020 3995 3895 3995 3895 3895 4020
[15] 3995 3895 3999 3990 3999 3990 4098 4398 3999 4248 3948 3899 3895 4295
[29] 4494 4594 4495 3895 4694 3999 4095 4395 3899 3948 4248 4095 3899 3849
[43] 4999 4248 3890 4104 3814 4048 3914 5399 3904 3899 4999 3899 3904 5399
[57] 3899 5399 3995 3895 3994 4799 3799 3799 3799 3799 3928 3984 4348 3984
[71] 4292 3872 3928 4348 4188
> boxplot(price,plot = FALSE)$out
 [1] 4395 4195 3995 3895 3990 4020 3895 4020 3995 3895 3995 3895 3895 4020
[15] 3995 3895 3999 3990 3999 3990 4098 4398 3999 4248 3948 3899 3895 4295
[29] 4494 4594 4495 3895 4694 3999 4095 4395 3899 3948 4248 4095 3899 3849
[43] 4999 4248 3890 4104 3814 4048 3914 5399 3904 3899 4999 3899 3904 5399
[57] 3899 5399 3995 3895 3994 4799 3799 3799 3799 3799 3928 3984 4348 3984
[71] 4292 3872 3928 4348 4188
> outliers<-boxplot(price,plot = FALSE)$out
```

```

> print(outliers)
[1] 4395 4195 3995 3895 3990 4020 3895 4020 3995 3895 3995 3895 3895 4020
[15] 3995 3895 3999 3990 3999 3990 4098 4398 3999 4248 3948 3899 3895 4295
[29] 4494 4594 4495 3895 4694 3999 4095 4395 3899 3948 4248 4095 3899 3849
[43] 4999 4248 3890 4104 3814 4048 3914 5399 3904 3899 4999 3899 3904 5399
[57] 3899 5399 3995 3895 3994 4799 3799 3799 3799 3799 3928 3984 4348 3984
[71] 4292 3872 3928 4348 4188
> computer[which(price %in% outliers),]
  x price speed  hd ram screen cd multi premium ads trend
20  20  4395   66  452   8   14   1   1      2   94    1
25  25  4195   50  452   8   14   1   1      2   94    1
28  28  3995   33  452   8   14   1   1      2   94    1
42  42  3895   66  500   8   15   1   1      2   94    1
61  61  3990   66  330   8   15   1   1      2   94    1
71  71  4020   66  500   8   14   2   1      2   94    1
113 113  3895   50  452   8   14   1   1      2   95    2
142 142  4020   66  500   8   14   2   1      2   95    2
145 145  3995   66  452   8   14   1   1      2   95    2
150 150  3895   66  500   8   15   1   1      2   95    2
201 201  3995   66  452   8   14   1   1      2  100    3
210 210  3895   66  500   8   15   1   1      2  100    3
224 224  3895   50  452   8   14   1   1      2  100    3
272 272  4020   66  500   8   14   2   1      2  100    3
291 291  3995   66  452   8   14   1   1      2  108    4
314 314  3895   50  452   8   14   1   1      2  108    4
415 415  3999   66  340  16   17   1   1      2  139    5
491 491  3990   66 1000  16   14   1   1      2  139    5
561 561  3999   66  345  16   17   1   1      2  176    6
616 616  3990   66 1000  16   14   1   1      2  176    6
646 646  4098   33  345  16   17   2   1      2  176    6
661 661  4398   66  345  16   17   2   1      2  176    6
720 720  3999   66  450   8   17   1   1      2  249    7
746 746  4248   66  345  16   17   2   1      2  249    7
773 773  3948   33  345  16   17   2   1      2  249    7
882 882  3899   66  345  16   17   1   1      2  249    7
901 901  3895   66 1370   8   14   1   1      2  249    7
982 982  4295   33 1100  16   14   1   1      2  298    8
994 994  4494   33 1100  16   14   2   1      2  298    8
1043 1043 4594   50 1100  16   14   2   1      2  298    8
1099 1099 4495   66 1100  16   14   1   1      2  298    8
1102 1102 3895   66 1370   8   14   1   1      2  298    8
1123 1123 4694   66 1100  16   14   2   1      2  298    8
1145 1145 3999   66  450   8   17   1   1      2  298    8
1155 1155 4095   66  500  16   17   1   1      2  298    8
1177 1177 4395   50 1100  16   14   1   1      2  298    8
1202 1202 3899   66  345  16   17   1   1      2  298    8
1204 1204 3948   33  345  16   17   2   1      2  298    8
1207 1207 4248   66  345  16   17   2   1      2  298    8
1336 1336 4095   66  500  16   17   1   1      2  246    9
1340 1340 3899   66  345  16   17   1   1      2  246    9
1365 1365 3849   66  450  16   15   1   1      2  246    9
1441 1441 4999   66  525   8   17   1   1      2  246    9
1446 1446 4248   66  345  16   17   2   1      2  246    9
1464 1464 3890   66  500  16   14   2   2      2  246    9
1467 1467 4104   66  527   8   15   2   1      1  246    9
1475 1475 3814   66  527   4   14   2   1      1  246    9
1478 1478 4048   66  345  16   17   2   1      2  246    9
1493 1493 3914   66  527   4   15   2   1      1  246    9
1507 1507 5399   66 1200  32   17   2   1      2  283   10
1517 1517 3904   66  527   8   15   2   1      1  283   10
1597 1597 3899   66  540  16   17   2   1      2  283   10
1701 1701 4999   66  525   8   17   2   1      2  283   10
1837 1837 3899   66  527  16   17   2   1      2  259   11
1974 1974 3904   66  527   8   15   2   1      1  259   11
1992 1992 5399   66 1200  32   17   2   1      2  259   11
2066 2066 3899   66  527  16   17   2   1      2  275   12
2097 2097 5399   66 1200  32   17   2   1      2  275   12
2149 2149 3995   66 1000  16   14   2   1      2  275   12

```

2205	2205	3895	50	1000	16	14	2	1	2	275	12
2282	2282	3994	66	424	32	15	2	1	2	275	12
2469	2469	4799	66	1000	16	17	2	1	2	216	13
2626	2626	3799	66	527	8	17	1	1	1	292	14
2924	2924	3799	66	527	8	17	1	1	1	267	15
3157	3157	3799	66	527	8	17	1	1	1	307	16
3505	3505	3799	66	527	8	17	1	1	1	339	17
4025	4025	3928	100	728	8	15	1	1	1	225	19
4074	4074	3984	66	340	8	17	1	1	1	225	19
4126	4126	4348	100	728	8	17	1	1	1	225	19
4283	4283	3984	66	364	8	17	1	1	1	248	20
4355	4355	4292	100	728	8	17	1	1	1	248	20
4366	4366	3872	100	728	8	15	1	1	1	248	20
4646	4646	3928	100	728	8	15	1	1	1	205	21
4686	4686	4348	100	728	8	17	1	1	1	205	21
4756	4756	4188	100	728	8	17	1	1	1	162	22

```
> computer <-computer[-which(price %in% outliers),]
```

```
> boxplot(hd)$out
```

```
[1] 1000 1000 1370 1370 1100 1100 1100 1370 1100 1370 1100 1100 1200
[14] 1370 1370 1370 1370 1370 1200 1370 1000 1200 1060 1000 1000 1060
[27] 1000 1000 1000 1000 1000 1000 1080 1000 1000 2100 1000 1000 1000
[40] 1000 1080 1000 1080 1000 1080 1000 1000 1000 1080 1080 1000 1000
[53] 1000 1000 1000 1000 1000 1080 1000 1000 1000 1000 1000 1000 1000
[66] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[79] 1000 1000 1000 1000 1000 1000 1000 1080 1000 1000 1000 1000 1080
[92] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1080 1000
[105] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1080 1000 1000 1000
[118] 1000 1000 1000 1080 1000 1000 1000 1000 1000 1000 1000 2100 1000
[131] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[144] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[157] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[170] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[183] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[196] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[209] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[222] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[235] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[248] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1080 1000 1000
[261] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[274] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[287] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[300] 1000 1000 1000 1000 1000 1080 1000 1000 1000 1000 1000 1000 1000
[313] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[326] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[339] 1000 1000 1000 1000 1000 1260 1000 1000 1000 1000 1000 1000 1000
[352] 1000 1000 1000 1000 1000 2100 1200 1200 1200 1000 1000 1200 1200
[365] 1000 1000 1000 1000 1000 1000 1200 1000 1200 1000 1200 1200 1200
[378] 1200 1000 1200 1200 1000 1000 1200 1000 1000 1000 1000 1000 1000
[391] 1000 1000 1000 1000 1200 1000 1000 1200 1200 1200 1000 1200 1000
[404] 1200 1000 1000 1000 1200 1200 1200 1200 1000 1000 1000 1000 1000
[417] 1200 1200 1200 1000 1200 1000 1000 1000 1200 1000 1200 1000 1000
[430] 1200 1200 1200 1200 1000 1000 1000 1000 1200 1000 1000 1000 1200
[443] 1000 1000 1000 1000 1200 1000 1200 1200 1200 1600 1200 1600 1200
[456] 1600 1600 1600 1200 1200 1600 1200 1200 1600 1200 1200 1200 1200
[469] 1600 1200 1200 1200 1600 1600 1200 1200 1600 1200 1600 1600 1200
[482] 1600 1600 1200 1200 1200 1600 1200 1200 1600 1200 1600 1600 1200
```

```
> boxplot(hd,plot = FALSE)$out
```

```
[1] 1000 1000 1370 1370 1100 1100 1100 1370 1100 1370 1100 1100 1200
[14] 1370 1370 1370 1370 1370 1200 1370 1000 1200 1060 1000 1000 1060
[27] 1000 1000 1000 1000 1000 1000 1080 1000 1000 2100 1000 1000 1000
[40] 1000 1080 1000 1080 1000 1080 1000 1000 1000 1080 1080 1000 1000
[53] 1000 1000 1000 1000 1000 1080 1000 1000 1000 1000 1000 1000 1000
[66] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
[79] 1000 1000 1000 1000 1000 1000 1000 1080 1000 1000 1000 1000 1080
[92] 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1080 1000
```



```

[469] 1600 1200 1200 1200 1600 1600 1200 1200 1600 1200 1600 1600 1200
[482] 1600 1600 1200 1200 1200 1600 1200 1200
> computer[which(hd %in% outliers),]
      x price speed  hd ram screen cd multi premium ads trend
527   527  2790   66  340   8   15  1    1    2  139    5
657   657  2775   50  250   8   17  1    1    2  176    6
768   768  1399   25  170   4   14  1    1    2  249    7
955   955  3144   50  452  16   14  1    1    2  249    7
1040 1040  3295   66  545   8   14  1    1    2  298    8
1053 1053  1999   33  120   4   14  1    1    1  298    8
1105 1105  2299   66  245   8   14  1    1    2  298    8
1111 1111  1944   25  214   4   14  1    1    2  298    8
1167 1167  1990   66  107   2   14  1    1    2  298    8
1170 1170  2694   33  340   4   14  2    1    2  298    8
1194 1194  2195   33  107   4   14  1    1    2  298    8
1255 1255  1848   33  130   4   14  2    1    2  298    8
1610 1610  2090   33  214   4   14  1    1    2  283   10
1628 1628  2644   66  426   8   14  1    1    2  283   10
1716 1716  1369   33  130   4   14  1    1    2  283   10
1795 1795  3244   66  528  16   14  1    1    2  259   11
1893 1893  1644   33  107   2   14  1    1    2  259   11
1944 1944  2299   66  120   4   14  1    1    1  259   11
2106 2106  2320   33  528   8   14  1    1    2  275   12
2160 2160  2595   33  424   8   17  1    1    2  275   12
2179 2179  2985   66  540   8   17  1    1    2  275   12
2216 2216  2699   66  245   8   15  2    1    2  275   12
2222 2222  2620   66  528   8   14  1    1    2  275   12
2269 2269  2290   66  107   2   14  2    2    2  275   12
2326 2326  1644   25  107   2   14  1    1    2  216   13
2405 2405  3354   66  420   4   15  2    1    1  216   13
2593 2593  2995   66  540  16   15  1    1    2  292   14
3277 3277  2899  100  527  16   15  2    1    2  307   16
3308 3308  1644   25  214   4   14  1    1    2  307   16
3361 3361  2499   66  528   8   15  2    1    2  307   16
3664 3664  2744  100  426   8   14  2    1    2  339   17
3781 3781  2029   33  420   4   14  2    2    2  273   18
3884 3884  2449  100  527   8   15  2    1    2  273   18
3904 3904  2890   33 1000  24   14  2    1    2  273   18
3915 3915  2618   66  428  16   17  2    1    2  273   18
3916 3916  1488   50  340   4   15  1    1    2  273   18
3923 3923  2268   33  212   4   15  1    1    1  273   18
3928 3928  2099   66  420   8   14  2    1    2  273   18
3929 3929  2490  100  426   8   14  2    1    2  273   18
3935 3935  1590   33  214   4   15  1    1    2  273   18
3942 3942  2738   66  170   4   15  1    1    1  273   18
3958 3958  3490  100 1000  24   15  2    1    2  273   18
3960 3960  2145   33  540   8   15  2    1    2  273   18
3966 3966  1695   50  340   8   14  1    1    2  273   18
3985 3985  1295   33  340   4   14  1    1    2  273   18
3986 3986  1890   33  426   8   15  2    1    2  273   18
3995 3995  2195   33  528  16   14  2    1    2  273   18
4006 4006  3078   50  212   4   17  1    1    1  273   18
4011 4011  2549  100  420   8   15  2    1    2  273   18
4012 4012  2195   75  420   4   14  2    1    2  273   18
4023 4023  2099   33  212   8   14  2    2    2  225   19
4027 4027  2493   33  528  16   14  2    2    2  225   19
4034 4034  1943   33  426   8   14  2    2    2  225   19
4037 4037  1299   33  340   4   14  2    1    2  225   19
4038 4038  2795  100  528  16   14  2    1    2  225   19
4041 4041  1195   25  214   4   14  1    1    2  225   19
4051 4051  1495   33  426   4   14  1    1    2  225   19
4054 4054  2595   66  528   8   15  2    1    2  225   19
4055 4055  2290   33  528  16   15  2    1    2  225   19
4092 4092  3628   66  270   4   17  1    1    1  225   19
4103 4103  1740   33  426   4   15  1    1    2  225   19
4111 4111  2590   66  528  16   14  2    1    2  225   19
4115 4115  1468   33  340   4   15  1    1    2  225   19
4132 4132  3040   33 1000  24   14  2    1    2  225   19

```

4141	4141	2404	33	528	16	14	2	1	2	225	19
4159	4159	2818	100	428	16	17	2	1	2	225	19
4163	4163	2890	100	528	16	15	2	1	2	225	19
4177	4177	3199	66	527	16	17	2	1	2	225	19
4204	4204	1399	50	340	4	14	1	1	2	225	19
4211	4211	1399	50	210	4	14	1	1	2	225	19
4217	4217	2299	66	540	8	15	2	2	2	225	19
4219	4219	3299	66	1000	16	15	2	1	2	225	19
4228	4228	3048	33	270	4	17	1	1	1	225	19
4231	4231	2299	66	428	16	15	2	1	2	225	19
4238	4238	1798	33	340	4	17	1	1	2	225	19
4252	4252	1488	66	340	4	15	1	1	2	248	20
4260	4260	2988	33	270	4	17	1	1	1	248	20
4267	4267	1418	33	250	2	17	1	1	2	248	20
4270	4270	2240	33	1000	8	14	2	1	2	248	20
4291	4291	1974	33	200	4	14	2	2	1	248	20
4299	4299	2045	66	730	8	15	2	1	2	248	20
4309	4309	2265	66	730	8	15	2	1	2	248	20
4319	4319	2628	33	270	4	15	1	1	1	248	20
4325	4325	2490	33	720	16	15	2	1	2	248	20
4332	4332	2090	33	528	8	15	2	1	2	248	20
4335	4335	1399	33	210	4	14	1	1	2	248	20
4338	4338	1469	33	212	4	14	1	1	2	248	20
4340	4340	1568	33	250	2	17	1	1	2	248	20
4342	4342	1395	33	214	4	14	1	1	2	248	20
4347	4347	1899	66	420	8	14	2	2	2	248	20

```
> computer <- computer[-which(hd %in% outliers),]
```

[1]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[23]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[45]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[67]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[89]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[111]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[133]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[155]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[177]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[199]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	32
[221]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[243]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[265]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[287]	16	16	32	16	16	16	16	16	16	16	16	16	16	16	16	16	16	32	16
[309]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[331]	16	32	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[353]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[375]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[397]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[419]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[441]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[463]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[485]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[507]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[529]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[551]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
[573]	16	16	16	16	24	16	16	24	16	16	24	16	24	24	24	16	16	24	16
[595]	16	16	16	24	24	16	16	24	16	16	24	16	24	16	24	24	16	24	16
[617]	24	16	16	16															


```

[221] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[243] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[265] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[287] 16 16 32 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 32 16
[309] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[331] 16 32 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[353] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[375] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[397] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[419] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[441] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[463] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[485] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[507] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[529] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[551] 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16
[573] 16 16 16 16 24 16 16 24 16 16 24 16 24 24 24 16 16 16 24 16 24
[595] 16 16 16 24 24 16 16 24 16 16 24 16 24 24 24 16 24 16 24 16 24
[617] 24 16 16 16 16 16 24 16 24 16 24 16 24 16 16 16 16 16 24 16 16
[639] 16 24 24 16 16 16 24 16 16 16 16 16 24 24 16 24 24 16 24 24 16
[661] 16 24 16 16 24 16 16 16 24 16 16 16 16 16 16 16 16 16 16 24
[683] 16 16 16 24 24 24 16 24 24 16 24 24 16 16 24 16 24 16 24 24
[705] 24 16 16 16 24 24 24 16 16 24 16 16 24 24 16 24 16 16 24 24
[727] 24 16 16 24 16 24 16 16 16 16 16 24 16 16 24 24 16 24 16 24
[749] 16 16 24 24 16 16 16 24 16 24 16 24 16 16 16 16 24 16 24 16
[771] 24 16 16 24 24 16 24 24 16 24 24 24 24 24 24 16 24 16 16 16
[793] 16 16 16 24 16 16 24 24 24 16 16 24 16 16 24 16 16 24 24 16
[815] 24 16 24 24 16 16 16 16 16 24 16 16 16 16 16 16 24 24 16 24
[837] 24 24 16 16 16 24 24 24 24 24 16 24 24 24 16 16 24 16 16 16
[859] 24 24 24 16 24 16 16 16 24 24 16 16 24 16 16 16 24 16 16 24
[881] 16 16 16 24 24 16 24 16 24 16 16 24 24 16 24 16 24 24 24 24
[903] 24 16 16 24 16 16 24 16 24 24 16 16 16 24 16 16 24 24 24 16
[925] 16 24 24 16 16 16 24 16 16 16 24 16 24 24 16 16 16 16 24 24
[947] 16 24 16 16 16 16 16 24 24 24 16 16 24 24 16 24 24 16 24 16
[969] 16 16 24 24 16 24 16 16 16 16 24 16 16 16 16 16 24 16 24 16
[991] 24 16 16 16 16 16 16 16 24 24

```

```

[ reached getOption("max.print") -- omitted 309 entries ]

```

```

> computer[which(ram %in% outliers),]

```

	x	price	speed	hd	ram	screen	cd	multi	premium	ads	trend
5	5	3295	33	340	16	14	1	1	2	94	1
6	6	3695	66	340	16	14	1	1	2	94	1
26	26	1290	33	80	2	14	1	1	2	94	1
35	35	1999	33	170	4	14	1	1	2	94	1
53	53	2995	66	340	8	15	1	1	2	94	1
107	107	2699	50	212	8	14	1	1	2	95	2
111	111	2995	66	340	8	15	1	1	2	95	2
128	128	2295	33	245	8	14	1	1	2	95	2
185	185	3795	66	500	8	14	1	1	2	95	2
211	211	2395	33	245	8	14	1	1	2	100	3
212	212	3135	66	250	8	17	1	1	2	100	3
245	245	2575	66	250	8	14	1	1	2	100	3
254	254	1720	25	170	4	14	2	1	2	100	3
274	274	2695	33	340	16	14	1	1	2	100	3
288	288	2475	50	250	8	14	1	1	2	100	3
298	298	2890	33	340	16	14	1	1	2	108	4
303	303	1895	33	170	4	14	1	1	2	108	4
305	305	2590	50	245	8	14	1	1	2	108	4
320	320	2195	66	170	4	14	1	1	2	108	4
327	327	2395	33	250	8	14	1	1	2	108	4
329	329	3090	66	340	16	14	1	1	2	108	4
336	336	2790	33	340	16	14	1	1	2	108	4
345	345	2345	33	250	8	15	1	1	2	108	4
354	354	2090	33	130	4	14	1	1	2	108	4
355	355	2075	66	170	4	14	1	1	2	108	4
361	361	1775	33	170	4	14	1	1	2	108	4
368	368	2645	50	250	8	15	1	1	2	108	4
370	370	2035	33	250	8	14	1	1	2	108	4
389	389	1395	25	85	2	14	1	1	2	108	4

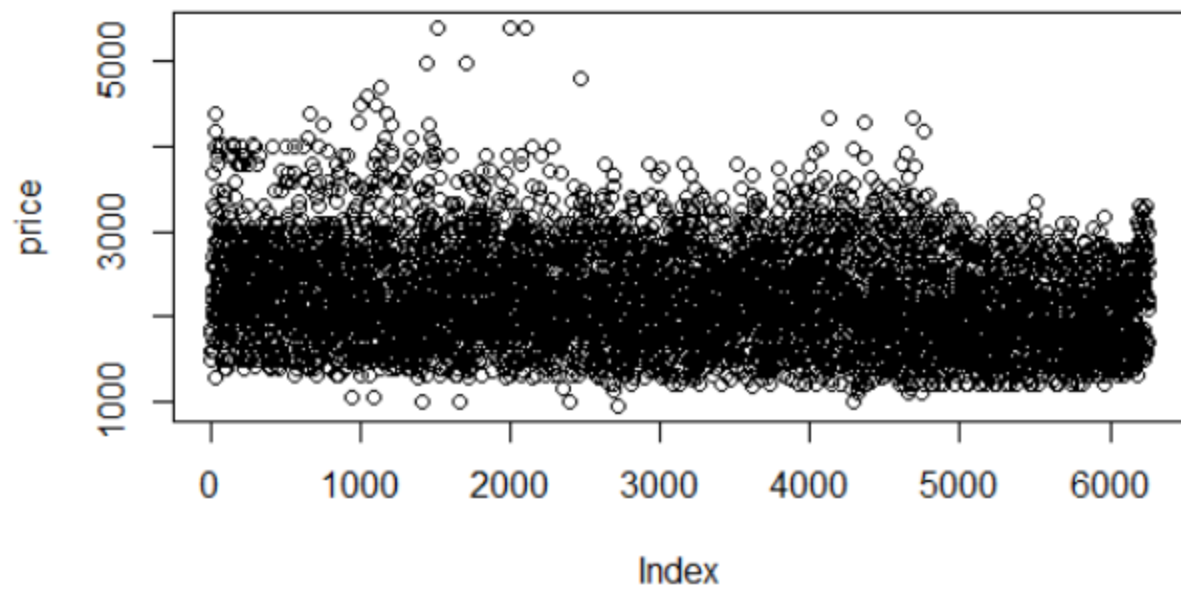
409	409	2590	33	340	8	15	1	1	2	139	5
410	410	2795	33	452	16	14	1	1	2	139	5
416	416	1699	33	120	4	14	1	1	2	139	5
429	429	1690	33	107	2	15	1	1	2	139	5
438	438	2019	33	120	4	14	1	1	1	139	5
439	439	3055	50	250	8	17	1	1	2	139	5
444	444	1699	33	170	4	14	1	1	2	139	5
449	449	1499	33	120	4	14	1	1	2	139	5
455	455	2515	33	250	8	15	1	1	2	139	5
456	456	2375	50	250	8	15	1	1	2	139	5
461	461	2695	66	250	8	14	1	1	2	139	5
465	465	1790	50	107	2	15	1	1	2	139	5
466	466	1795	66	107	2	14	1	1	2	139	5
467	467	2995	66	340	8	15	2	1	2	139	5
474	474	2299	33	405	8	14	1	1	2	139	5
480	480	2290	50	214	4	15	1	1	2	139	5
495	495	2690	50	340	8	15	1	1	2	139	5
499	499	2190	33	214	4	14	1	1	2	139	5
528	528	1590	33	107	2	14	1	1	2	139	5
534	534	2335	66	250	8	14	1	1	2	139	5
545	545	2390	33	340	8	14	1	1	2	176	6
550	550	1790	50	107	2	15	1	1	2	176	6
564	564	1895	33	212	8	14	1	1	2	176	6
571	571	1720	33	170	4	14	2	1	2	176	6
579	579	2790	66	340	8	14	1	1	2	176	6
592	592	1945	33	250	4	15	1	1	2	176	6
594	594	1599	66	130	4	14	1	1	2	176	6
597	597	2745	33	540	8	14	1	1	2	176	6
598	598	2899	66	340	8	15	1	1	2	176	6
600	600	1675	25	120	4	14	1	1	1	176	6
618	618	2275	33	250	8	15	1	1	2	176	6
627	627	2595	66	340	8	15	1	1	2	176	6
633	633	1990	33	214	4	14	1	1	2	176	6
643	643	1899	25	120	4	14	1	1	1	176	6
645	645	1925	50	170	4	15	1	1	2	176	6
653	653	2390	33	340	8	15	1	1	2	176	6
659	659	2520	50	212	8	15	2	1	2	176	6
690	690	3045	66	540	8	14	1	1	2	176	6
692	692	2345	50	250	8	15	1	1	2	176	6
693	693	2390	66	214	4	15	1	1	2	176	6
707	707	3398	66	345	16	15	2	1	2	176	6
713	713	1690	33	107	2	15	1	1	2	249	7
718	718	3599	33	345	16	17	1	1	2	249	7
721	721	3025	33	1370	8	14	1	1	2	249	7
741	741	2990	50	452	16	14	1	1	2	249	7
748	748	2044	33	107	2	14	1	1	2	249	7
753	753	1890	25	214	4	14	1	1	2	249	7
756	756	1999	33	245	8	14	1	1	2	249	7
760	760	1999	33	120	4	14	1	1	1	249	7
766	766	2144	50	107	2	14	1	1	2	249	7
767	767	2744	25	452	16	14	1	1	2	249	7
780	780	3595	50	452	8	14	1	1	2	249	7
791	791	2195	50	214	4	14	1	1	2	249	7
792	792	2995	66	340	16	15	2	1	2	249	7
793	793	1829	33	170	4	14	2	2	2	249	7
799	799	2944	33	452	16	14	1	1	2	249	7
807	807	2290	50	214	4	14	1	1	2	249	7
817	817	2744	50	340	8	14	1	1	2	249	7
820	820	2344	50	214	4	14	1	1	2	249	7
826	826	1795	33	107	2	14	1	1	2	249	7
827	827	1559	50	130	4	14	1	1	2	249	7

[reached 'max' / getOption("max.print") -- omitted 1219 rows]

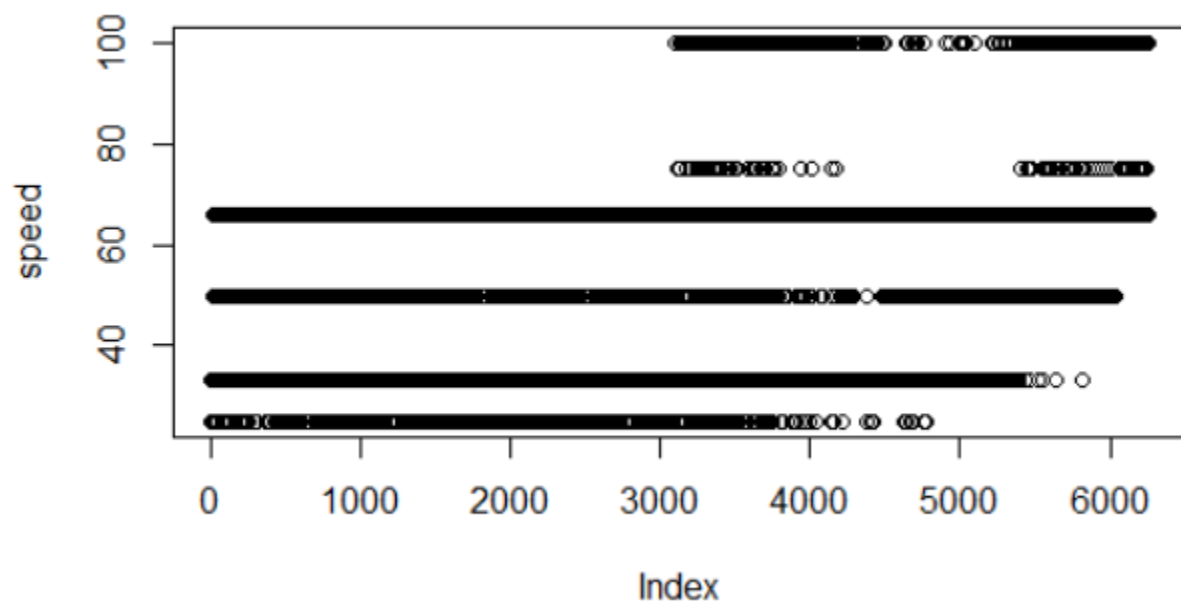
```

> computer <-computer[-which(ram %in% outliers),]
> plot(price)

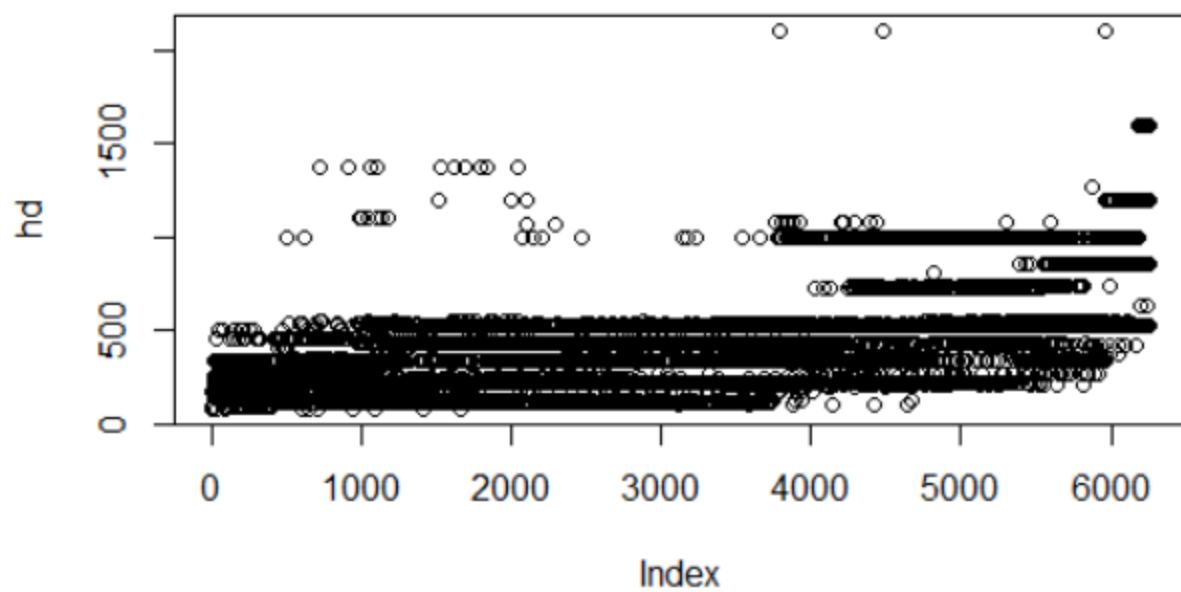
```



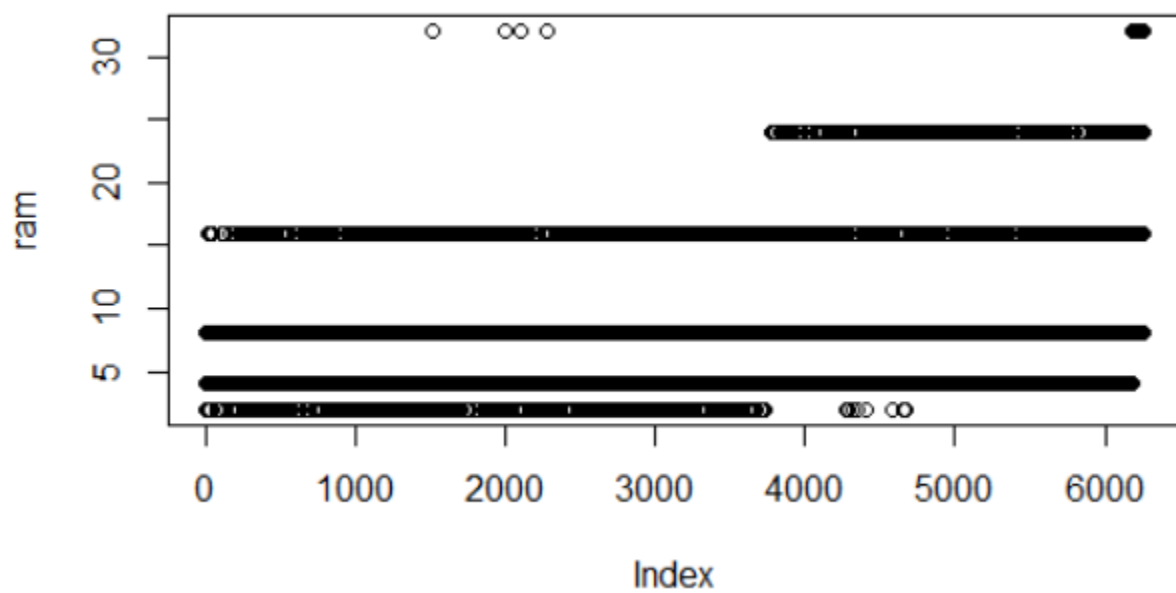
```
> plot(speed)
```



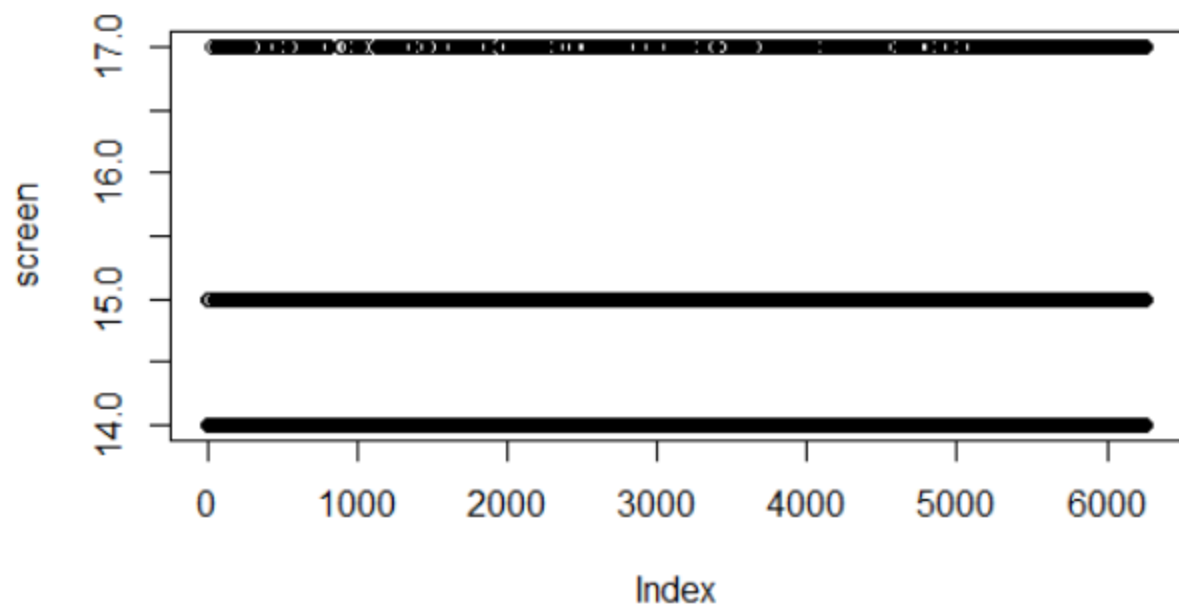
```
> plot(hd)
```



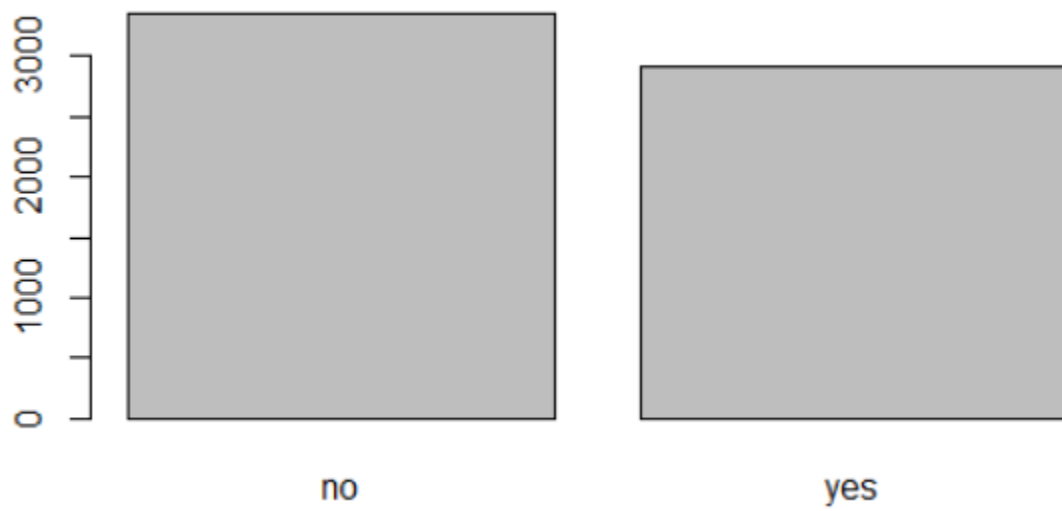
```
> plot(ram)
```



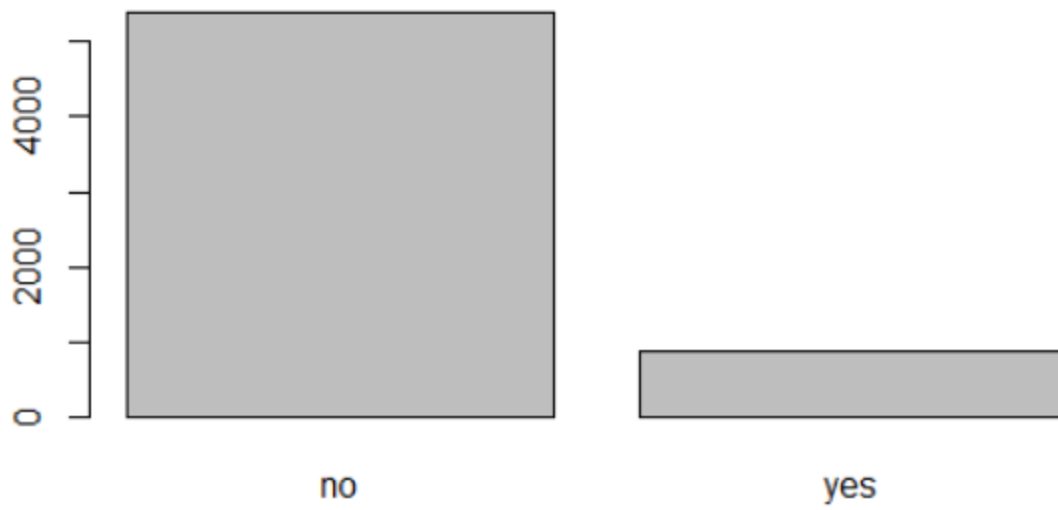
```
> plot(screen)
```



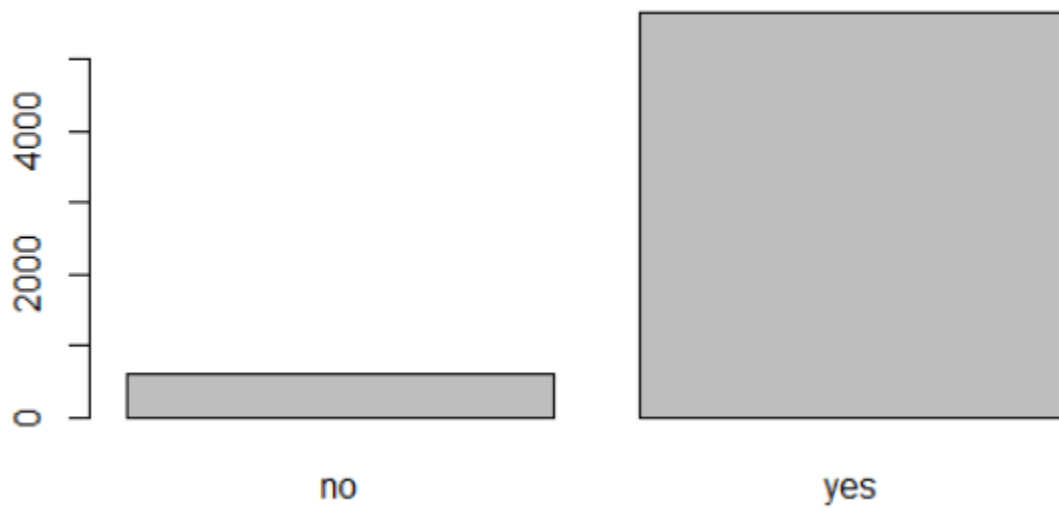
```
> plot(cd)
```



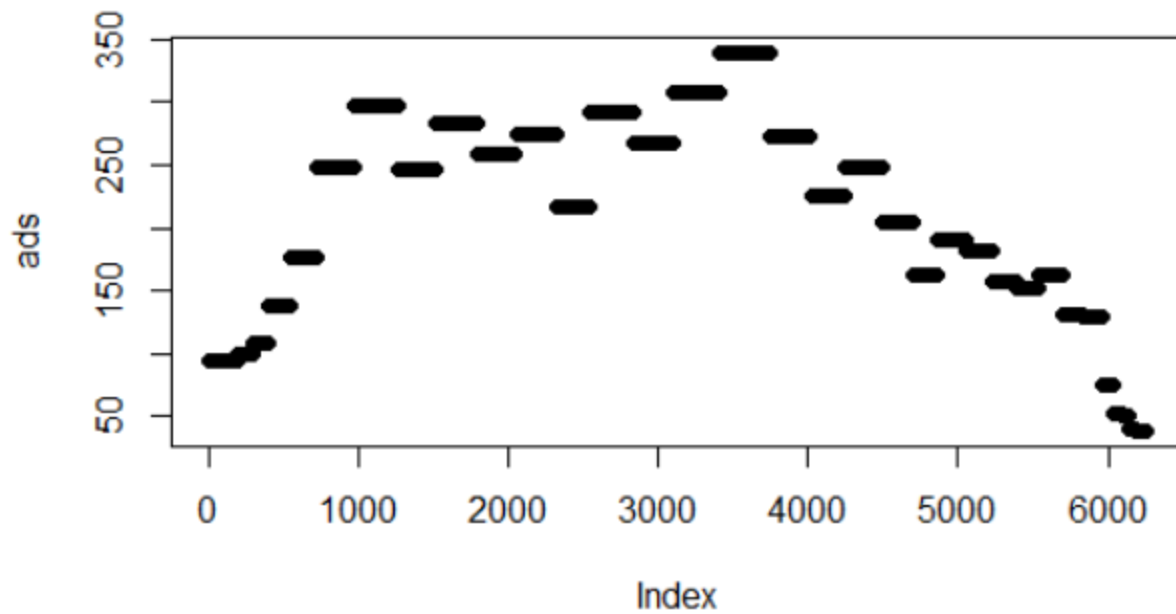
```
> plot(multi)
```



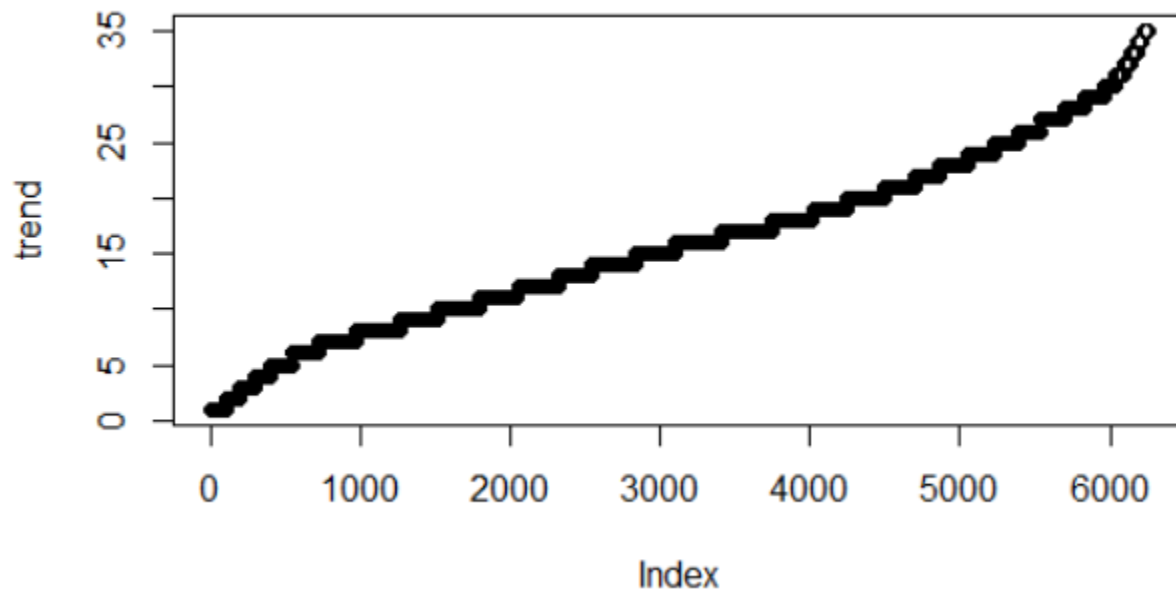
```
> plot(premium)
```



```
> plot(ads)
```



```
> plot(trend)
```



```
> cor(computer)
```

	x	price	speed	hd	ram
x	1.00000000	-0.17271065	0.37811305	0.5683035	0.26839910
price	-0.17271065	1.00000000	0.31296526	0.4406689	0.63372477
speed	0.37811305	0.31296526	1.00000000	0.3541950	0.22081122
hd	0.56830353	0.44066894	0.35419499	1.00000000	0.78377567
ram	0.26839910	0.63372477	0.22081122	0.7837757	1.00000000
screen	0.18095945	0.28823076	0.18613454	0.2348070	0.19756227
cd	0.46379952	0.20314125	0.24900816	0.4986072	0.42069344
multi	0.22212069	0.00294618	0.08349724	0.1039915	0.05341659
premium	0.02405261	-0.07006548	0.12645365	0.1940000	0.19441340
ads	-0.16520880	0.04255029	-0.16504441	-0.2591388	-0.15273204
trend	0.99116373	-0.17557781	0.39056390	0.5855535	0.27569245

	screen	cd	multi	premium	ads
x	0.180959453	0.46379952	0.222120689	0.02405261	-0.16520880
price	0.288230764	0.20314125	0.002946180	-0.07006548	0.04255029
speed	0.186134541	0.24900816	0.083497244	0.12645365	-0.16504441

```

hd      0.234806999  0.49860719  0.103991531  0.193999999 -0.25913876
ram     0.197562272  0.42069344  0.053416588  0.19441340 -0.15273204
screen  1.000000000  0.12307625 -0.001400028  0.02448463 -0.08176563
cd      0.123076253  1.00000000  0.444671220  0.20294381 -0.01065581
multi   -0.001400028  0.44467122  1.000000000  0.12383221 -0.01637314
premium 0.024484629  0.20294381  0.123832209  1.00000000 -0.15150369
ads     -0.081765631 -0.01065581 -0.016373142 -0.15150369 1.00000000
trend   0.183682165  0.45199523  0.218500115  0.02726572 -0.19994774
      trend
x      0.99116373
price  -0.17557781
speed   0.39056390
hd      0.58555345
ram     0.27569245
screen  0.18368217
cd      0.45199523
multi   0.21850011
premium 0.02726572
ads     -0.19994774
trend   1.00000000
> library(corpcor)

> cor2pcor(cor(computer))
      [,1]      [,2]      [,3]      [,4]      [,5]
[1,] 1.00000000 0.09736614 -0.096280807 -0.1400985 -0.005853513
[2,] 0.097366139 1.00000000 0.559424267 0.3369846 0.498505580
[3,] -0.096280807 0.55942427 1.000000000 -0.1313751 -0.291945583
[4,] -0.140098523 0.33698463 -0.131375082 1.00000000 0.445343918
[5,] -0.005853513 0.49850558 -0.291945583 0.4453439 1.000000000
[6,] -0.018184092 0.34796227 -0.113786967 -0.0762082 -0.133548317
[7,] 0.131559646 0.07016099 0.000287645 0.1037336 0.082002775
[8,] -0.044669238 0.14013843 -0.095952576 -0.1365527 -0.102490743
[9,] 0.054994722 -0.47238044 0.324408803 0.2189706 0.250643550
[10,] 0.187560480 0.17440150 -0.138026482 -0.1783769 -0.060224493
[11,] 0.969700749 -0.26871263 0.218900683 0.2756272 0.039971529
      [,6]      [,7]      [,8]      [,9]      [,10]
[1,] -0.01818409 0.131559646 -0.04466924 0.05499472 0.18756048
[2,] 0.34796227 0.070160995 0.14013843 -0.47238044 0.17440150
[3,] -0.11378697 0.000287645 -0.09595258 0.32440880 -0.13802648
[4,] -0.07620820 0.103733597 -0.13655271 0.21897060 -0.17837690
[5,] -0.13354832 0.082002775 -0.10249074 0.25064355 -0.06022449
[6,] 1.00000000 -0.021831344 -0.08148934 0.14411046 -0.07970586
[7,] -0.02183134 1.00000000 0.40575776 0.14031465 0.12626417
[8,] -0.08148934 0.405757759 1.00000000 0.12480564 -0.05747094
[9,] 0.14411046 0.140314646 0.12480564 1.00000000 -0.03383587
[10,] -0.07970586 0.126264174 -0.05747094 -0.03383587 1.00000000
[11,] 0.08621845 -0.077243471 0.08254429 -0.15884582 -0.15971433
      [,11]
[1,] 0.96970075
[2,] -0.26871263
[3,] 0.21890068
[4,] 0.27562722
[5,] 0.03997153
[6,] 0.08621845
[7,] -0.07724347
[8,] 0.08254429
[9,] -0.15884582
[10,] -0.15971433
[11,] 1.00000000
> computer_model<- lm(price~speed+hd+ram+screen+trend+multi+ads+premium+cd)
> summary(computer_model)

```

```

Call:
lm(formula = price ~ speed + hd + ram + screen + trend + multi +
    ads + premium + cd)

```

```

Residuals:
      Min       1Q   Median       3Q      Max

```

-1093.77 -174.24 -11.49 146.49 2001.05

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	307.98798	60.35341	5.103	3.44e-07	***
speed	9.32028	0.18506	50.364	< 2e-16	***
hd	0.78178	0.02761	28.311	< 2e-16	***
ram	48.25596	1.06608	45.265	< 2e-16	***
screen	123.08904	3.99950	30.776	< 2e-16	***
trend	-51.84958	0.62871	-82.470	< 2e-16	***
multiyes	104.32382	11.41268	9.141	< 2e-16	***
ads	0.65729	0.05132	12.809	< 2e-16	***
premiumyes	-509.22473	12.34225	-41.259	< 2e-16	***
cdyes	60.91671	9.51559	6.402	1.65e-10	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 275.3 on 6249 degrees of freedom
Multiple R-squared: 0.7756, Adjusted R-squared: 0.7752
F-statistic: 2399 on 9 and 6249 DF, p-value: < 2.2e-16

> confint(computer_model,level = 0.95)

	2.5 %	97.5 %
(Intercept)	189.6745555	426.3014141
speed	8.9575054	9.6830562
hd	0.7276466	0.8359130
ram	46.1660735	50.3458447
screen	115.2486548	130.9294298
trend	-53.0820620	-50.6171003
multiyes	81.9510473	126.6965911
ads	0.5566962	0.7578865
premiumyes	-533.4197905	-485.0296733
cdyes	42.2628739	79.5705428

> predict(computer_model,interval="predict")

	fit	lwr	upr
1	2020.5189	1480.2307	2560.807
2	2002.4781	1462.1928	2542.763
3	2213.9681	1673.6559	2754.280
4	2793.1276	2252.3186	3333.937
5	2877.4154	2336.9431	3417.888
6	3184.9847	2644.4373	3725.532
7	2151.7958	1611.1124	2692.479
8	2160.9229	1620.6247	2701.221
9	2548.1811	2007.9146	3088.448
10	2478.2463	1937.9523	3018.540
11	2481.5542	1941.2636	3021.845
12	2697.3056	2156.9666	3237.645
13	2292.6149	1752.3440	2832.886
14	2342.5364	1802.2634	2882.809
15	2549.7447	2009.4788	3090.011
16	2292.6149	1752.3440	2832.886
17	2002.4781	1462.1928	2542.763
18	2319.8016	1779.5049	2860.098
19	2351.0727	1810.7585	2891.387
20	2886.4963	2346.0904	3426.902
21	2134.1701	1593.9105	2674.430
22	2441.7394	1901.3935	2982.085
23	2802.8531	2262.3591	3343.347
24	2724.4244	2183.7547	3265.094
25	2737.3718	2197.0249	3277.719
26	1998.5692	1458.2838	2538.855
27	2134.1701	1593.9105	2674.430
28	2578.9271	2038.5744	3119.280
29	2877.4154	2336.9431	3417.888
30	2724.6679	2184.3388	3264.997
31	2226.3580	1685.6990	2767.017
32	2059.6079	1519.3292	2599.887
33	2759.0035	2218.3528	3299.654

34	2478.2463	1937.9523	3018.540
35	2165.4413	1625.1807	2705.702
36	2627.3708	2087.0149	3167.727
37	2697.3056	2156.9666	3237.645
38	2924.0218	2383.5649	3464.479
39	2548.1811	2007.9146	3088.448
40	2548.1811	2007.9146	3088.448
41	2575.5434	2035.2849	3115.802
42	3047.1108	2506.6600	3587.562
43	2391.2999	1851.0427	2931.557
44	2389.7363	1849.4787	2929.994
45	3035.8602	2495.3823	3576.338
46	2417.0986	1876.8469	2957.350
47	2134.1701	1593.9105	2674.430
48	2051.7901	1511.5106	2592.070
49	2356.7208	1816.4434	2896.998
50	2227.9837	1687.6951	2768.272
51	2165.4413	1625.1807	2705.702
52	2134.1701	1593.9105	2674.430
53	2922.0260	2381.6935	3462.359
54	2196.7125	1656.4422	2736.983
55	2900.5246	2359.7363	3441.313
56	2292.6149	1752.3440	2832.886
57	2441.7394	1901.3935	2982.085
58	2873.5489	2332.8345	3414.263
59	3066.5727	2525.8938	3607.252
60	2292.6149	1752.3440	2832.886
61	2914.2082	2373.8785	3454.538
62	2288.5304	1748.2426	2828.818
63	2544.0966	2003.8286	3084.365
64	2288.9004	1748.2316	2829.569
65	2310.0474	1769.6728	2850.422
66	2090.8791	1550.5983	2631.160
67	2441.7394	1901.3935	2982.085
68	2051.7901	1511.5106	2592.070
69	2198.2761	1658.0051	2738.547
70	2724.6679	2184.3388	3264.997
71	2984.9385	2444.2240	3525.653
72	2565.9796	2025.2891	3106.670
73	2165.4413	1625.1807	2705.702
74	2575.5434	2035.2849	3115.802
75	2323.8861	1783.6166	2864.156
76	2417.0986	1876.8469	2957.350
77	2389.7363	1849.4787	2929.994
78	2982.9427	2442.3175	3523.568
79	2292.6149	1752.3440	2832.886
80	2722.7675	2181.9089	3263.626
81	2643.0064	2102.6451	3183.368
82	2417.0986	1876.8469	2957.350
83	2820.3947	2280.0560	3360.733
84	2605.0133	2064.4149	3145.612
85	2342.5364	1802.2634	2882.809
86	2828.6009	2287.7798	3369.422
87	2389.7363	1849.4787	2929.994
88	2134.1701	1593.9105	2674.430
89	1927.9159	1387.6123	2468.219
90	2641.9947	2101.7280	3182.261
91	2724.4244	2183.7547	3265.094
92	2441.7394	1901.3935	2982.085
93	2542.4709	2001.8316	3083.110
94	2548.1811	2007.9146	3088.448
95	3133.7924	2593.2724	3674.312
96	2039.6868	1499.4360	2579.938
97	2114.2490	1574.0197	2654.478
98	2175.1657	1634.5482	2715.783
99	2751.6609	2211.1876	3292.134
100	2114.2490	1574.0197	2654.478
101	2176.7914	1636.5386	2717.044

102	2291.3441	1751.0991	2831.589
103	2258.8551	1718.5154	2799.195
104	2669.9921	2129.6182	3210.366
105	1876.7236	1336.4482	2416.999
106	3046.6516	2506.0240	3587.279
107	2498.5524	1958.3167	3038.788
108	2100.6035	1559.9603	2641.247
109	2421.8183	1881.5127	2962.124
110	2421.8183	1881.5127	2962.124
111	2870.8337	2330.5423	3411.125
112	2082.9778	1542.7472	2623.208
113	2686.1795	2145.8764	3226.483
114	2984.6679	2444.2148	3525.121
115	2039.6868	1499.4360	2579.938
116	2853.6278	2312.9465	3394.309
117	2458.3252	1918.0557	2998.595
118	2677.3845	2137.0912	3217.678
119	2114.2490	1574.0197	2654.478
120	2161.1558	1620.9121	2701.400
121	2114.2490	1574.0197	2654.478
122	2145.5202	1605.2835	2685.757
123	2528.2600	1988.0344	3068.486
124	2931.7504	2391.1765	3472.324
125	2491.2786	1950.6756	3031.882
126	2365.9063	1825.6838	2906.129
127	2704.5033	2163.8618	3245.145
128	2365.9063	1825.6838	2906.129
129	1951.2858	1411.0301	2491.542
130	2272.6938	1732.4583	2812.929
131	2390.5471	1850.2355	2930.859
132	2039.6868	1499.4360	2579.938
133	2237.7081	1697.0853	2778.331
134	2272.6938	1732.4583	2812.929
135	2000.5978	1460.3454	2540.850
136	2291.3441	1751.0991	2831.589
137	2528.2600	1988.0344	3068.486
138	2299.8805	1759.6032	2840.158
139	2553.8210	2013.2634	3094.379
140	2241.4226	1701.1834	2781.662
141	2369.8152	1829.5933	2910.037
142	2933.7462	2393.0910	3474.401
143	2528.2600	1988.0344	3068.486
144	2272.6938	1732.4583	2812.929
145	2835.3040	2294.9445	3375.664
146	2673.4756	2133.1811	3213.770
147	2421.8183	1881.5127	2962.124
148	2147.0838	1606.8464	2687.321
149	2369.8152	1829.5933	2910.037
150	2995.9185	2455.5179	3536.319
151	2299.8805	1759.6032	2840.158
152	2492.9043	1952.6670	3033.142
153	2739.9269	2199.6338	3280.220
154	2369.8152	1829.5933	2910.037
155	2340.1076	1799.8778	2880.337
156	2800.4736	2260.1825	3340.765
157	2272.6938	1732.4583	2812.929
158	2430.3619	1890.0973	2970.626
159	2704.5033	2163.8618	3245.145
160	2591.8141	2051.4939	3132.134
161	2082.9778	1542.7472	2623.208
162	2162.7758	1622.4947	2703.057
163	2458.3252	1918.0557	2998.595
164	2528.2600	1988.0344	3068.486
165	2826.2231	2285.7729	3366.673
166	2008.4156	1468.1646	2548.667
167	2524.3511	1984.1246	3064.578
168	2303.9650	1763.7245	2844.206
169	1951.2858	1411.0301	2491.542

170	2777.4086	2236.6182	3318.199
171	2677.3845	2137.0912	3217.678
172	2492.9043	1952.6670	3033.142
173	2237.3381	1697.0827	2777.593
174	2673.4756	2133.1811	3213.770
175	2527.7348	1987.4232	3068.046
176	2607.4497	2067.1231	3147.776
177	2305.5286	1765.2875	2845.770
178	2739.0824	2198.4731	3279.692
179	2114.2490	1574.0197	2654.478
180	2109.7306	1569.4647	2649.996
181	2272.6938	1732.4583	2812.929
182	2546.0585	2005.3911	3086.726
183	2000.5978	1460.3454	2540.850
184	2524.3511	1984.1246	3064.578
185	2872.8295	2332.4217	3413.237
186	2365.9063	1825.6838	2906.129
187	2114.2490	1574.0197	2654.478
188	2677.3845	2137.0912	3217.678
189	2826.2231	2285.7729	3366.673
190	3134.0492	2593.4654	3674.633
191	2065.6859	1525.4965	2605.875
192	2255.4019	1715.2058	2795.598
193	2292.3263	1752.1329	2832.520
194	2224.1307	1683.9376	2764.324
195	2224.1307	1683.9376	2764.324
196	2321.2521	1781.0682	2861.436
197	2098.5207	1558.3254	2638.716
198	2034.4147	1494.2220	2574.607
199	2189.1450	1648.5790	2729.711
200	2883.1873	2342.6745	3423.700
201	2786.7409	2246.4343	3327.047
202	2690.5192	2149.9510	3231.087
203	2602.7859	2062.5955	3142.976
204	1991.1237	1450.9117	2531.336
205	1902.7227	1362.5057	2442.940
206	2334.1662	1793.8940	2874.438
207	2689.3680	2149.0802	3229.656
208	2479.1716	1938.9082	3019.435
209	2373.2552	1832.9943	2913.516
210	2947.3554	2407.0112	3487.700
211	2317.3432	1777.1584	2857.528
212	2998.0885	2457.5067	3538.670
213	2442.7155	1902.1602	2983.271
214	2373.2552	1832.9943	2913.516
215	2998.0885	2457.5067	3538.670
216	1828.1605	1287.9227	2368.398
217	2317.3432	1777.1584	2857.528
218	2034.4147	1494.2220	2574.607
219	2777.6600	2237.2401	3318.080
220	2065.6859	1525.4965	2605.875
221	2690.5192	2149.9510	3231.087
222	2751.9104	2211.6632	3292.158
223	2450.7710	1910.5742	2990.968
224	2637.6164	2097.3639	3177.869
225	2449.9893	1909.7920	2990.186
226	2566.2790	2025.9894	3106.569
227	2126.6026	1586.0378	2667.167
228	2936.1048	2395.6846	3476.525
229	2096.9571	1556.7624	2637.152
230	2848.9640	2308.4219	3389.506
231	2728.8455	2188.0976	3269.593
232	2505.2579	1964.7521	3045.764
233	2065.6859	1525.4965	2605.875
234	2381.7988	1841.5692	2922.028
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237	2114.2127	1573.9714	2654.454

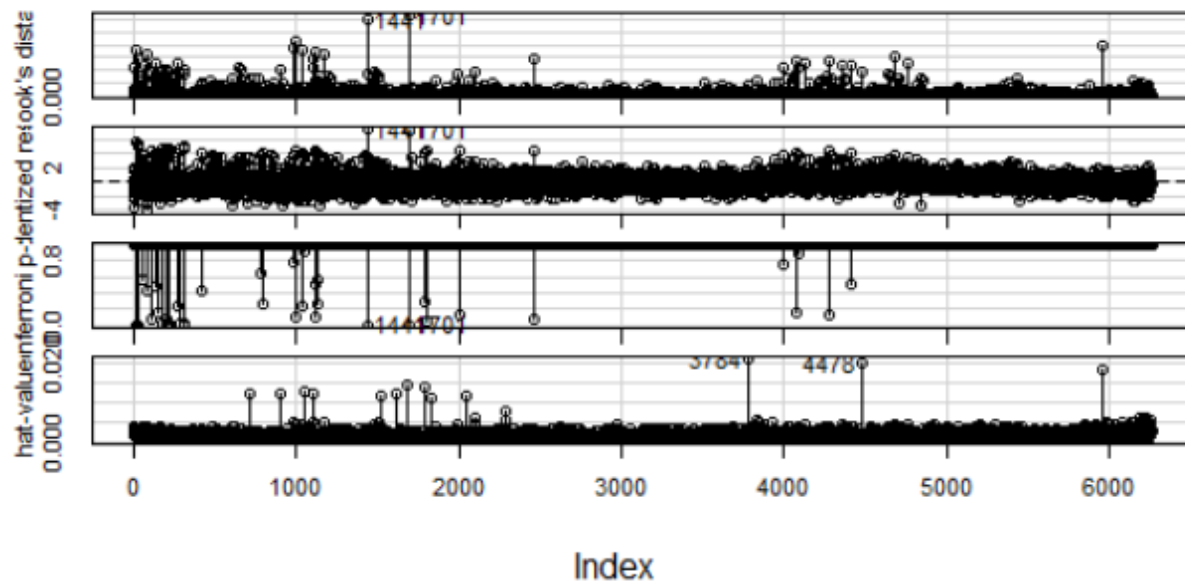
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241	2026.5969	1486.4021	2566.792
242	1959.8525	1419.6383	2500.067
243	2479.6969	1939.5117	3019.882
244	2475.7880	1935.6017	3015.974
245	2628.8214	2088.5708	3169.072
246	2444.3412	1904.1429	2984.539
247	3134.0492	2593.4654	3674.633
248	2599.8955	2059.6312	3140.160
249	2061.1675	1520.9428	2601.392
250	2373.2552	1832.9943	2913.516
251	2599.8955	2059.6312	3140.160
252	1991.1237	1450.9117	2531.336
253	2258.7097	1718.4961	2798.923
254	2052.0404	1511.4487	2592.632
255	1902.7227	1362.5057	2442.940
256	2334.1662	1793.8940	2874.438
257	2848.9640	2308.4219	3389.506
258	2112.5927	1572.3920	2652.793
259	2065.6859	1525.4965	2605.875
260	2826.4799	2285.9544	3367.005
261	2822.2706	2282.0275	3362.514
262	2444.3412	1904.1429	2984.539
263	2381.7988	1841.5692	2922.028
264	2479.6969	1939.5117	3019.882
265	2185.0417	1644.8401	2725.243
266	2192.8595	1652.6607	2733.058
267	2417.1545	1876.9348	2957.374
268	2540.2436	2000.0171	3080.470
269	2984.9247	2444.4023	3525.447
270	2629.2468	2088.9189	3169.575
271	2251.3173	1711.0851	2791.550
272	2885.1830	2344.5960	3425.770
273	2602.7859	2062.5955	3142.976
274	2777.6600	2237.2401	3318.080
275	2444.3412	1904.1429	2984.539
276	3085.2292	2544.7444	3625.714
277	2224.1307	1683.9376	2764.324
278	2291.5445	1751.3507	2831.738
279	2628.8214	2088.5708	3169.072
280	2210.2920	1669.9958	2750.588
281	2321.2521	1781.0682	2861.436
282	2128.2283	1588.0195	2668.437
283	2256.9654	1716.7690	2797.162
284	2188.7749	1648.5606	2728.989
285	2751.9104	2211.6632	3292.158
286	2624.9125	2084.6605	3165.165
287	1991.1237	1450.9117	2531.336
288	2479.6969	1939.5117	3019.882
289	2703.0977	2162.6537	3243.542
290	2014.5762	1474.3973	2554.755
291	2740.1497	2199.8989	3280.400
292	2504.4775	1964.2567	3044.698
293	2429.1967	1889.0547	2969.339
294	2582.2301	2042.0261	3122.434
295	2210.3742	1670.2264	2750.522
296	2656.5065	2116.0960	3196.917
297	2274.6609	1734.5192	2814.803
298	2731.0687	2190.6835	3271.454
299	2019.0947	1478.9498	2559.240
300	1944.5324	1404.3639	2484.701
301	1913.2612	1373.0886	2453.434
302	1913.2612	1373.0886	2453.434
303	2019.0947	1478.9498	2559.240
304	2938.3335	2397.8444	3478.822
305	2429.1967	1889.0547	2969.339

```

306 1944.5324 1404.3639 2484.701
307 2802.3728 2261.8781 3342.867
308 2433.1056 1892.9650 2973.246
309 2556.1947 2016.0498 3096.340
310 2432.5804 1892.3685 2972.792
311 2245.7350 1705.5822 2785.888
312 2403.3980 1863.2435 2943.553
313 2889.5135 2349.1301 3429.897
314 2591.0252 2050.8264 3131.224
315 2582.2301 2042.0261 3122.434
316 2177.5394 1637.3930 2717.686
317 2287.5749 1747.3492 2827.801
318 2643.9280 2103.4049 3184.451
319 2582.2301 2042.0261 3122.434
320 2326.6639 1786.4518 2866.876
321 2705.3192 2165.1195 3245.519
322 3038.6380 2498.1921 3579.084
323 2779.8887 2239.3944 3320.383
324 2270.7520 1730.6092 2810.895
325 1856.1315 1315.9580 2396.305
326 1856.1315 1315.9580 2396.305
327 2274.6609 1734.5192 2814.803
328 2051.9294 1511.7806 2592.078
329 3038.6380 2498.1921 3579.084
330 2196.9083 1656.7289 2737.088
331 2019.0947 1478.9498 2559.240
332 2146.2682 1606.1143 2686.422
333 1987.8235 1447.6734 2527.973
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> influenceIndexPlot(computer_model, id.n=3)

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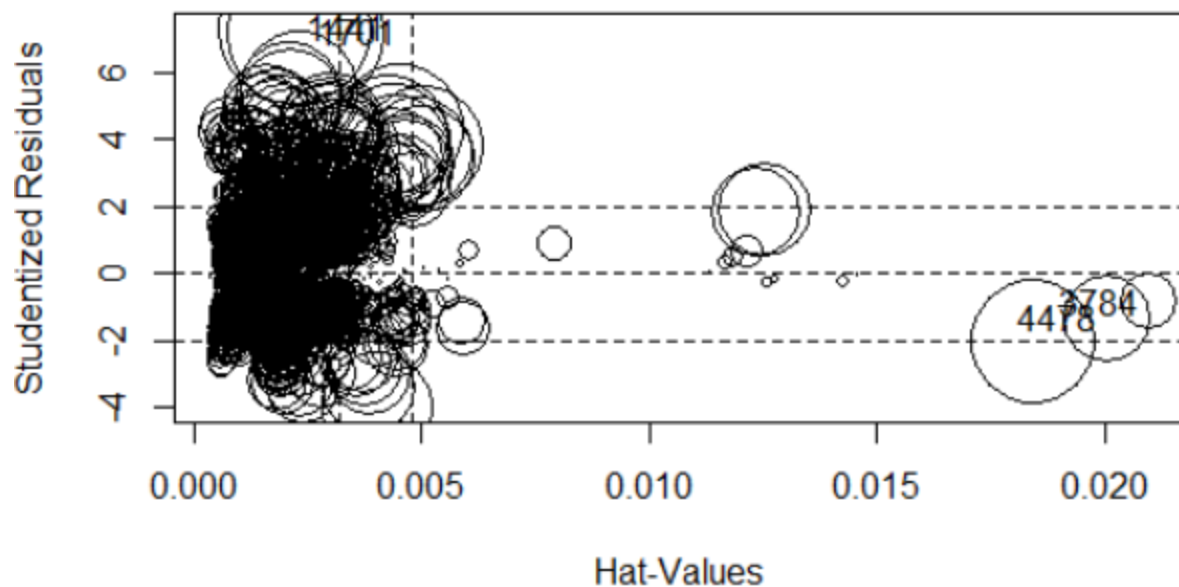
Diagnostic Plots



```

> influencePlot(computer_model, id.n=3)
      StudRes      Hat      CookD
1441  7.3058529 0.002228075 0.011819949
1701  7.1838002 0.002464463 0.012647347
3784 -0.8667018 0.020972880 0.001609237
4478 -1.3795547 0.020060286 0.003895407

```



```
> computer_model1<- lm(price~log(speed)+log(hd)+log(ram)+log(screen)+log(trend)+log(multi)+log(ads)+log(premium)+log(cd),data = computer[-c(1441,1701),])
> summary(computer_model1)
```

```
Call:
lm(formula = price ~ log(speed) + log(hd) + log(ram) + log(screen) +
    log(trend) + log(multi) + log(ads) + log(premium) + log(cd),
    data = computer[-c(1441, 1701), ])

Residuals:
```

	Min	1Q	Median	3Q	Max
Residuals	-1266.18	-192.12	-11.23	170.71	1394.27

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5930.623	211.761	-28.006	< 2e-16 ***
log(speed)	427.735	11.187	38.234	< 2e-16 ***
log(hd)	263.589	14.778	17.837	< 2e-16 ***
log(ram)	428.566	12.338	34.735	< 2e-16 ***
log(screen)	1411.867	74.146	19.042	< 2e-16 ***
log(trend)	-471.671	8.358	-56.433	< 2e-16 ***
log(multi)	124.041	19.520	6.355	2.29e-10 ***
log(ads)	369.060	10.349	35.663	< 2e-16 ***
log(premium)	-673.751	20.658	-32.614	< 2e-16 ***
log(cd)	41.154	15.977	2.576	0.01 *

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 276.3 on 4592 degrees of freedom
 Multiple R-squared: 0.7429, Adjusted R-squared: 0.7424
 F-statistic: 1475 on 9 and 4592 DF, p-value: < 2.2e-16

```
> confint(computer_model1,level = 0.95)
```

	2.5 %	97.5 %
(Intercept)	-6345.776534	-5515.46847
log(speed)	405.802592	449.66754
log(hd)	234.617492	292.55959
log(ram)	404.377605	452.75466
log(screen)	1266.504862	1557.22842
log(trend)	-488.056836	-455.28507
log(multi)	85.772353	162.31048
log(ads)	348.772121	389.34864
log(premium)	-714.251953	-633.25089

```

log(cd)          9.832025    72.47684
> predict(computer_model1,interval="predict")
      fit      lwr      upr
1  2131.113 1588.1677 2674.057
2  1968.786 1425.8108 2511.761
3  2427.207 1884.1965 2970.217
4  3093.867 2550.2398 3637.493
7  2358.324 1814.7079 2901.941
8  2146.517 1603.4713 2689.562
9  2979.040 2436.1874 3521.892
10 2779.389 2236.3040 3322.474
11 2843.019 2300.1621 3385.876
12 3097.792 2554.8299 3640.755
13 2555.570 2012.7216 3098.419
14 2723.189 2180.2649 3266.112
15 2981.538 2438.6850 3524.391
16 2555.570 2012.7216 3098.419
17 1968.786 1425.8108 2511.761
18 2601.658 2058.5794 3144.737
19 2647.616 2104.3686 3190.863
22 2674.323 2131.3521 3217.294
23 3106.623 2563.5171 3649.728
24 2956.103 2412.4889 3499.716
29 3225.376 2682.3422 3768.409
30 3138.425 2595.4360 3681.414
32 2259.087 1716.2455 2801.928
33 3075.431 2532.0473 3618.816
34 2779.389 2236.3040 3322.474
36 2898.142 2354.9678 3441.316
37 3097.792 2554.8299 3640.755
38 3326.456 2782.8675 3870.044
39 2979.040 2436.1874 3521.892
40 2979.040 2436.1874 3521.892
41 3019.672 2476.7871 3562.557
43 2803.808 2260.9914 3346.624
44 2801.309 2258.4944 3344.124
45 3403.106 2860.0534 3946.159
47 2377.840 1835.0466 2920.633
48 2237.989 1695.1552 2780.822
49 2684.479 2141.4172 3227.540
50 2550.207 2007.0051 3093.409
51 2448.551 1905.6700 2991.432
52 2377.840 1835.0466 2920.633
54 2504.250 1961.2212 3047.278
55 3270.816 2727.1758 3814.457
56 2555.570 2012.7216 3098.419
57 2674.323 2131.3521 3217.294
58 3074.855 2531.1764 3618.535
59 3371.915 2828.4745 3915.355
60 2555.570 2012.7216 3098.419
62 2545.960 2003.0218 3088.898
63 2944.675 2401.7809 3487.570
64 2578.733 2034.8932 3122.573
65 2265.269 1722.0921 2808.447
67 2674.323 2131.3521 3217.294
68 2237.989 1695.1552 2780.822
69 2506.748 1963.7114 3049.785
70 3138.425 2595.4360 3681.414
72 2778.372 2234.7289 3322.015
73 2448.551 1905.6700 2991.432
74 3019.672 2476.7871 3562.557
75 2626.282 2083.3619 3169.201
76 2841.941 2299.0844 3384.799
78 3350.734 2807.1107 3894.358
79 2555.570 2012.7216 3098.419
80 2895.181 2351.1635 3439.198
81 2922.121 2378.8744 3465.367
82 2841.941 2299.0844 3384.799

```

83	3195.201	2652.2368	3738.166
84	2973.201	2429.7918	3516.611
85	2723.189	2180.2649	3266.112
86	3120.810	2577.1252	3664.494
87	2801.309	2258.4944	3344.124
88	2377.840	1835.0466	2920.633
89	1850.033	1307.0195	2393.047
90	3098.178	2555.1255	3641.230
91	2956.103	2412.4889	3499.716
92	2674.323	2131.3521	3217.294
93	2871.545	2328.1443	3414.946
94	2979.040	2436.1874	3521.892
95	3198.827	2656.1160	3741.538
96	2006.766	1464.2726	2549.260
97	2125.519	1583.1014	2667.937
98	2154.045	1611.0663	2697.024
99	2783.591	2240.8676	3326.314
100	2125.519	1583.1014	2667.937
101	2227.175	1684.5594	2769.791
102	2400.157	1857.6536	2942.660
103	1942.237	1399.4856	2484.989
104	2694.248	2151.3111	3237.185
105	1527.001	984.3556	2069.647
106	3094.840	2551.8879	3637.793
108	2035.292	1492.2286	2578.356
109	2422.002	1879.4760	2964.529
110	2422.002	1879.4760	2964.529
112	2054.808	1512.3922	2597.223
114	3080.074	2537.4450	3622.703
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116	2797.781	2254.6092	3340.953
117	2502.315	1959.6906	3044.939
118	2820.718	2278.2078	3363.228
119	2125.519	1583.1014	2667.937
121	2125.519	1583.1014	2667.937
122	2181.218	1638.7199	2723.716
123	2701.965	2159.5416	3244.389
124	3027.702	2484.7749	3570.630
125	2548.513	2005.5463	3091.480
126	2518.909	1976.4896	3061.329
127	2679.028	2135.8981	3222.158
129	1645.754	1103.1634	2188.345
130	2303.250	1760.8178	2845.681
131	2351.291	1808.7387	2893.844
132	2006.766	1464.2726	2549.260
133	2255.701	1712.5532	2798.850
134	2303.250	1760.8178	2845.681
135	1914.957	1372.4588	2457.454
136	2400.157	1857.6536	2942.660
137	2701.965	2159.5416	3244.389
138	2324.584	1781.9303	2867.238
139	2650.170	2107.3169	3193.022
140	2232.538	1690.0918	2774.985
141	2524.235	1981.8130	3066.656
143	2701.965	2159.5416	3244.389
144	2303.250	1760.8178	2845.681
146	2815.393	2272.8823	3357.903
147	2422.002	1879.4760	2964.529
148	2183.716	1641.2132	2726.219
149	2524.235	1981.8130	3066.656
151	2324.584	1781.9303	2867.238
153	2893.899	2351.3283	3436.469
154	2524.235	1981.8130	3066.656
156	2918.127	2375.6274	3460.626
157	2303.250	1760.8178	2845.681
158	2519.987	1977.4580	3062.516
159	2679.028	2135.8981	3222.158
161	2054.808	1512.3922	2597.223

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165	2902.344	2359.7092	3444.978
166	1936.055	1393.5747	2478.535
167	2696.640	2154.2169	3239.063
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169	1645.754	1103.1634	2188.345
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171	2820.718	2278.2078	3363.228
172	2621.643	2079.2001	3164.087
173	2222.928	1680.4605	2765.395
174	2815.393	2272.8823	3357.903
175	2680.337	2137.5816	3223.093
176	2621.067	2078.3780	3163.757
177	2361.447	1818.9436	2903.950
178	2798.357	2255.4014	3341.313
179	2125.519	1583.1014	2667.937
180	1823.485	1280.8484	2366.121
181	2303.250	1760.8178	2845.681
182	2501.298	1958.1025	3044.493
183	1914.957	1372.4588	2457.454
184	2696.640	2154.2169	3239.063
186	2518.909	1976.4896	3061.329
187	2125.519	1583.1014	2667.937
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189	2902.344	2359.7092	3444.978
190	3037.545	2494.8134	3580.277
191	1953.203	1410.9698	2495.437
192	2186.632	1644.3671	2728.898
193	2309.700	1767.4189	2851.982
194	2130.934	1588.6981	2673.170
195	2130.934	1588.6981	2673.170
196	2351.919	1809.6686	2894.169
197	2011.400	1469.1205	2553.680
198	1882.492	1340.2134	2424.771
199	2083.386	1540.5534	2626.218
200	2855.387	2312.7723	3398.001
202	2626.041	2083.2679	3168.815
203	2627.058	2084.8195	3169.297
204	1834.450	1292.1331	2376.768
205	1473.438	930.9905	2015.886
206	2157.877	1615.4378	2700.316
207	2644.155	2101.6562	3186.653
208	2508.022	1965.5413	3050.502
209	2249.687	1707.3640	2792.009
214	2249.687	1707.3640	2792.009
215	2922.525	2379.7740	3465.275
216	1354.685	812.1748	1897.196
217	2346.594	1804.3417	2888.846
218	1882.492	1340.2134	2424.771
219	2730.028	2187.5382	3272.517
220	1953.203	1410.9698	2495.437
221	2626.041	2083.2679	3168.815
223	2487.431	1945.1492	3029.712
225	2486.190	1943.9070	3028.474
226	2546.746	2004.2444	3089.248
227	1981.729	1438.9988	2524.460
228	2907.758	2365.2857	3450.231
229	2008.902	1466.6255	2551.178
230	2803.772	2261.0632	3346.480
231	2625.462	2082.2014	3168.722
232	2477.854	1935.2406	3020.467
233	1953.203	1410.9698	2495.437
234	2347.671	1805.2497	2890.093
235	2227.841	1685.4978	2770.184
236	2178.975	1636.5795	2721.371
238	1953.203	1410.9698	2495.437

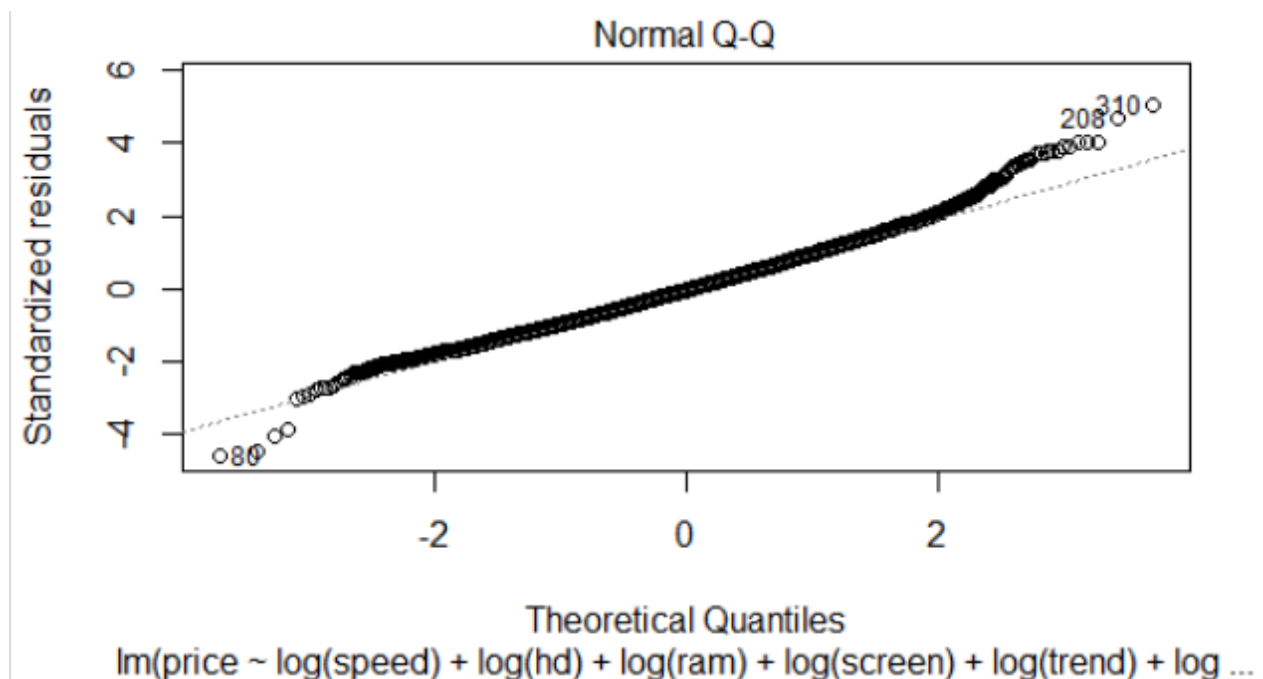
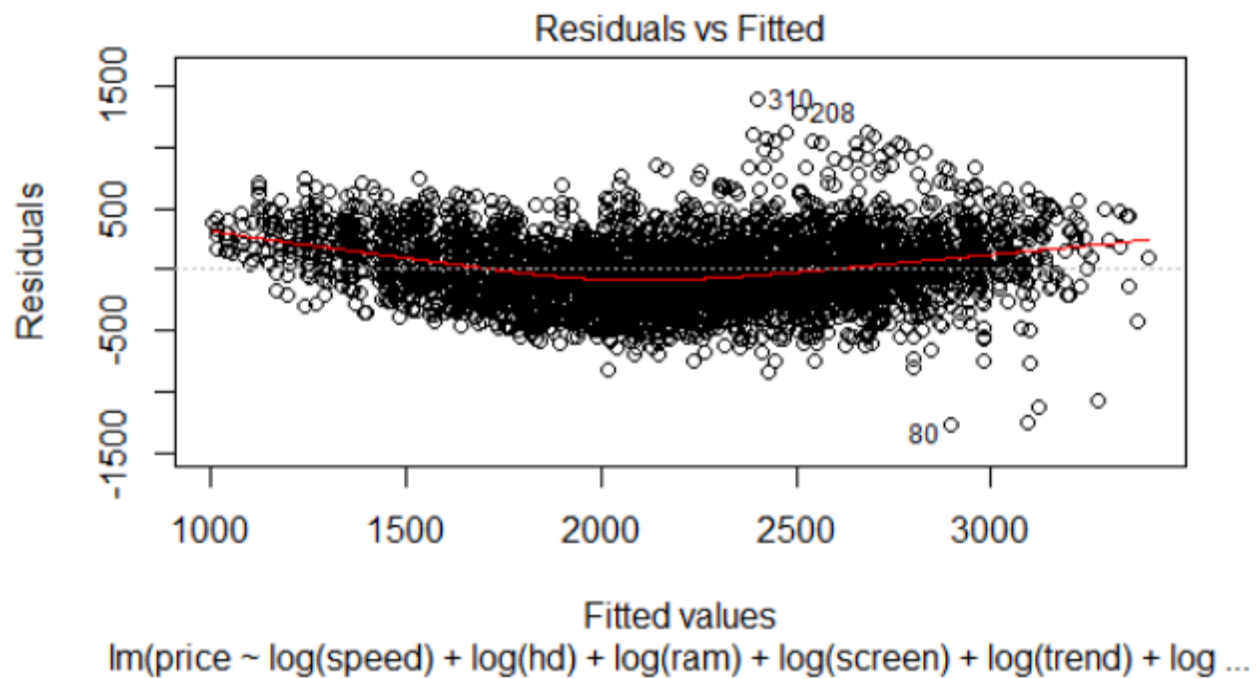
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243	2529.649	1987.4090	3071.890
244	2524.324	1982.0808	3066.568
246	2449.328	1907.0596	2991.596
247	3037.545	2494.8134	3580.277
248	2606.184	2063.8165	3148.551
249	1651.169	1108.6873	2193.650
250	2249.687	1707.3640	2792.009
251	2606.184	2063.8165	3148.551
252	1834.450	1292.1331	2376.768
253	2250.263	1707.8704	2792.655
255	1473.438	930.9905	2015.886
256	2157.877	1615.4378	2700.316
257	2803.772	2261.0632	3346.480
258	2032.881	1490.5649	2575.197
259	1953.203	1410.9698	2495.437
260	2741.062	2198.3887	3283.735
261	2826.860	2284.5460	3369.175
262	2449.328	1907.0596	2991.596
263	2347.671	1805.2497	2890.093
264	2529.649	1987.4090	3071.890
265	2039.124	1496.7864	2581.462
266	2060.223	1517.9248	2602.520
267	2427.993	1885.5865	2970.400
268	2525.402	1982.9853	3067.819
269	2918.792	2376.1352	3461.450
270	2529.801	1987.1600	3072.442
271	2152.268	1609.8705	2694.666
273	2627.058	2084.8195	3169.297
275	2449.328	1907.0596	2991.596
276	3026.511	2483.9646	3569.058
277	2130.934	1588.6981	2673.170
278	2308.460	1766.1770	2850.743
279	2648.402	2106.0830	3190.722
280	1769.922	1227.3323	2312.511
281	2351.919	1809.6686	2894.169
282	2054.860	1512.4956	2597.223
283	2189.131	1646.8626	2731.399
284	2050.612	1508.3329	2592.891
285	2745.811	2203.5066	3288.115
287	1834.450	1292.1331	2376.768
289	2611.275	2068.6887	3153.861
290	1543.881	1001.4842	2086.277
292	2330.703	1788.4647	2872.942
293	2417.036	1874.8900	2959.182
294	2541.114	1998.8986	3083.330
295	2081.843	1539.7099	2623.976
296	2503.987	1961.4708	3046.503
297	2244.631	1702.4742	2786.788
299	1845.915	1303.7857	2388.045
300	1727.162	1184.9450	2269.380
301	1656.451	1114.1690	2198.733
302	1656.451	1114.1690	2198.733
304	2811.504	2268.8921	3354.117
307	2696.484	2153.8814	3239.086
308	2422.361	1880.2206	2964.502
309	2519.770	1977.6335	3061.907
310	2400.734	1858.4149	2943.052
311	2202.412	1660.2061	2744.618
312	2378.902	1836.6996	2921.105
313	2800.470	2258.0780	3342.863
315	2541.114	1998.8986	3083.330
316	2023.646	1481.5200	2565.772
317	2050.589	1508.2237	2592.954
318	2518.753	1976.0800	3061.427

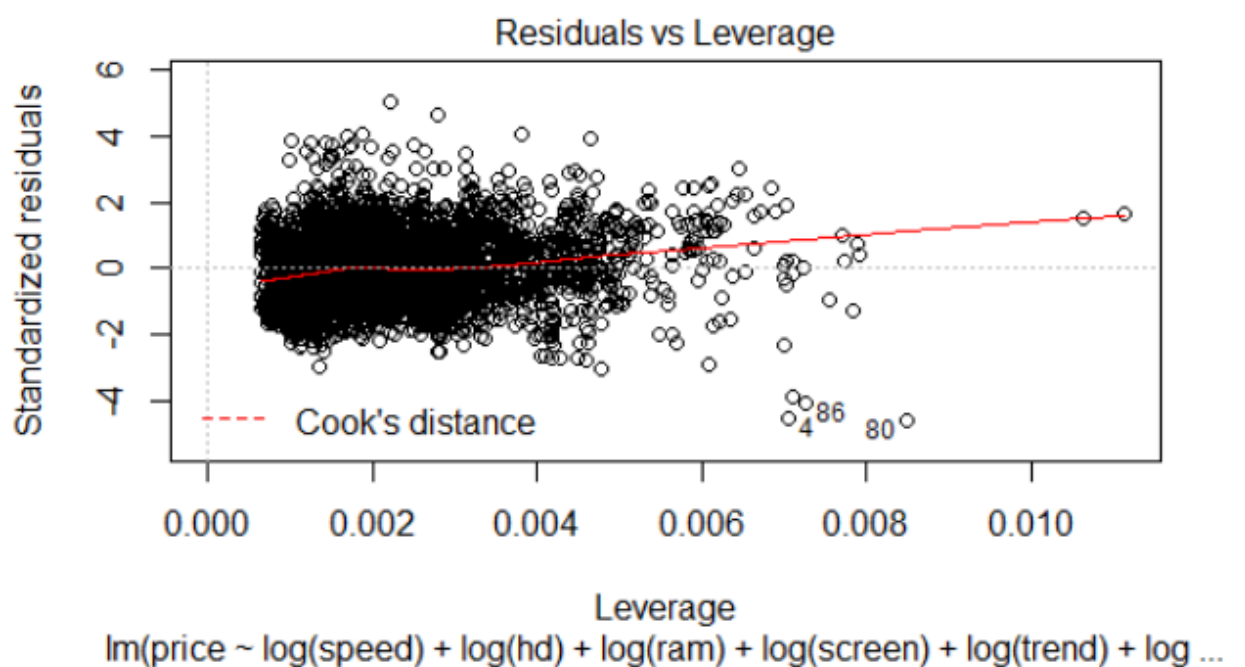
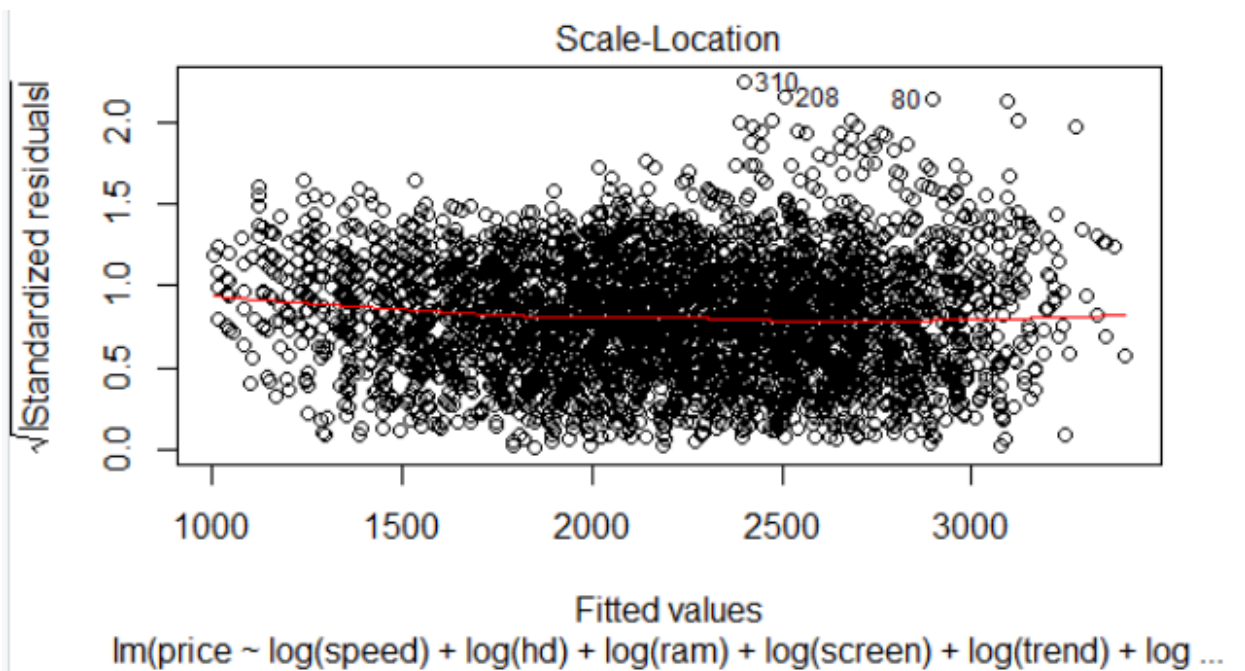
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322 2919.223 2376.7609 3461.685
323 2633.774 2091.1396 3176.408
324 2239.306 1697.1449 2781.466
325 1366.150 823.7813 1908.519
326 1366.150 823.7813 1908.519
328 1904.112 1361.9617 2446.263
331 1845.915 1303.7857 2388.045
332 1952.934 1410.7159 2495.153
333 1775.204 1232.9985 2317.409
334 2023.646 1481.5200 2565.772
335 1754.106 1211.8559 2296.355
337 1845.915 1303.7857 2388.045
338 2800.470 2258.0780 3342.863
339 2815.237 2272.5963 3357.877
340 2518.753 1976.0800 3061.427
341 2071.687 1529.3746 2614.000
342 2498.896 1956.6137 3041.177
343 2719.572 2177.3993 3261.746
344 1366.150 823.7813 1908.519
346 2380.143 1837.9424 2922.343
347 1952.934 1410.7159 2495.153
348 2519.770 1977.6335 3061.907
349 2342.040 1799.8675 2884.212
350 2023.646 1481.5200 2565.772
351 2422.361 1880.2206 2964.502
352 2422.361 1880.2206 2964.502
353 2519.770 1977.6335 3061.907
356 2211.951 1669.7671 2754.134
357 2930.257 2387.5744 3472.940
358 2638.523 2096.3246 3180.721
359 2815.237 2272.5963 3357.877
360 2239.306 1697.1449 2781.466
362 1775.204 1232.9985 2317.409
363 2422.361 1880.2206 2964.502
364 2696.484 2153.8814 3239.086
365 2638.523 2096.3246 3180.721
366 1727.162 1184.9450 2269.380
367 2221.115 1678.3306 2763.898
369 1662.634 1120.1332 2205.134
371 2239.306 1697.1449 2781.466
372 2765.013 2222.1172 3307.910
373 2535.789 1993.5673 3078.011
374 2120.553 1578.2970 2662.809
375 1662.634 1120.1332 2205.134
376 1775.204 1232.9985 2317.409
377 2622.740 2080.3244 3165.155
378 2503.987 1961.4708 3046.503
379 1366.150 823.7813 1908.519
380 1247.397 704.9616 1789.833
381 2342.040 1799.8675 2884.212
382 2498.896 1956.6137 3041.177
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384 2120.553 1578.2970 2662.809
385 2239.306 1697.1449 2781.466
386 2201.172 1658.9636 2743.380
387 1543.881 1001.4842 2086.277
388 2050.589 1508.2237 2592.954
390 2023.646 1481.5200 2565.772
391 2071.687 1529.3746 2614.000
392 2535.789 1993.5673 3078.011
393 1931.836 1389.5683 2474.104
394 1727.162 1184.9450 2269.380
[ reached getOption("max.print") -- omitted 4269 rows ]
> plot(computer_model1)
Hit <Return> to see next plot:
Hit <Return> to see next plot:

```

Hit <Return> to see next plot:
Hit <Return> to see next plot:





```
> computer_model2<- lm(price~log(speed)+log(hd)+log(ram)+screen+trend+multi+ads+premium+cd,data = computer[-c(1441,1701),])
> summary(computer_model2)
```

call:

```
lm(formula = price ~ log(speed) + log(hd) + log(ram) + screen +
    trend + multi + ads + premium + cd, data = computer[-c(1441,
    1701), ])
```

Residuals:

	Min	1Q	Median	3Q	Max
Residuals	-879.99	-179.80	-14.26	164.15	1252.70

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)				
log(speed)				
log(hd)				
log(ram)				
screen				
trend				
multi				
ads				
premium				
cd				

```

(Intercept) -2.170e+03  8.978e+01 -24.166 < 2e-16 ***
log(speed)   4.486e+02  1.054e+01  42.565 < 2e-16 ***
log(hd)      3.089e+02  1.400e+01  22.065 < 2e-16 ***
log(ram)     3.930e+02  1.170e+01  33.591 < 2e-16 ***
screen      9.818e+01  4.565e+00  21.508 < 2e-16 ***
trend       -4.743e+01  7.295e-01 -65.009 < 2e-16 ***
multi        8.308e+01  1.273e+01   6.525 7.53e-11 ***
ads          5.486e-01  5.475e-02  10.020 < 2e-16 ***
premium     -4.788e+02  1.351e+01 -35.435 < 2e-16 ***
cd           6.768e+01  1.051e+01   6.436 1.35e-10 ***

```

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

Residual standard error: 260.2 on 4592 degrees of freedom
Multiple R-squared:  0.7721, Adjusted R-squared:  0.7717
F-statistic: 1729 on 9 and 4592 DF, p-value: < 2.2e-16

```

```

> confint(computer_model2, level = 0.95)

```

```

                2.5 %          97.5 %
(Intercept) -2345.60033 -1993.5884096
log(speed)   427.97834   469.3058850
log(hd)      281.49587   336.3958134
log(ram)     370.02294   415.8914934
screen      89.22962    107.1279220
trend       -48.85680   -45.9963168
multi        58.11926   108.0425427
ads          0.44128     0.6559499
premium     -505.24868  -452.2726812
cd           47.06338    88.2910224

```

```

> predict(computer_model2, interval="predict")

```

```

      fit      lwr      upr
1  1744.9750 1234.0245 2255.925
2  1615.8848 1105.1019 2126.668
3  2076.0284 1565.3071 2586.750
4  2728.9875 2217.6257 3240.349
7  2045.5268 1534.3276 2556.726
8  1802.3025 1291.4659 2313.139
9  2626.4849 2115.8352 3137.135
10 2452.2865 1941.5830 2962.990
11 2472.9629 1962.2316 2983.694
12 2751.0422 2240.2982 3261.786
13 2205.9456 1695.2869 2716.604
14 2363.1341 1852.4489 2873.819
15 2629.4133 2118.7661 3140.061
16 2205.9456 1695.2869 2716.604
17 1615.8848 1105.1019 2126.668
18 2265.8688 1755.1626 2776.575
19 2319.7345 1808.9294 2830.540
22 2330.5029 1819.7379 2841.268
23 2736.7489 2225.8485 3247.649
24 2648.6440 2137.4355 3159.853
29 2861.3062 2350.4843 3372.128
30 2798.6664 2287.9513 3309.382
32 1894.9706 1384.2960 2405.645
33 2734.6035 2223.4471 3245.760
34 2452.2865 1941.5830 2962.990
36 2576.8438 2066.0617 3087.626
37 2751.0422 2240.2982 3261.786
38 3019.0529 2508.0150 3530.091
39 2626.4849 2115.8352 3137.135
40 2626.4849 2115.8352 3137.135
41 2674.1091 2163.4830 3184.735
43 2442.9956 1932.3687 2953.622
44 2440.0672 1929.4383 2950.696
45 3047.7240 2536.8992 3558.549
47 2019.5279 1508.9079 2530.148
48 1870.2417 1359.5456 2380.938
49 2357.0361 1846.3462 2867.726

```

50	2221.5557	1710.7804	2732.331
51	2102.4069	1591.7996	2613.014
52	2019.5279	1508.9079	2530.148
54	2167.6900	1657.0178	2678.362
55	2921.7563	2410.4688	3433.044
56	2205.9456	1695.2869	2716.604
57	2330.5029	1819.7379	2841.268
58	2773.2013	2261.9362	3284.466
59	3045.5785	2534.3895	3556.768
60	2205.9456	1695.2869	2716.604
62	2200.5857	1689.9393	2711.232
63	2592.1117	2081.4829	3102.741
64	2289.2329	1777.9511	2800.515
65	1926.8598	1415.9069	2437.813
67	2330.5029	1819.7379	2841.268
68	1870.2417	1359.5456	2380.938
69	2170.6184	1659.9417	2681.295
70	2798.6664	2287.9513	3309.382
72	2462.2263	1950.9821	2973.471
73	2102.4069	1591.7996	2613.014
74	2674.1091	2163.4830	3184.735
75	2288.8247	1778.1925	2799.457
76	2487.6914	1977.0781	2998.305
78	3065.7600	2554.6550	3576.865
79	2205.9456	1695.2869	2716.604
80	2496.1128	1984.1028	3008.123
81	2604.9491	2094.1289	3115.769
82	2487.6914	1977.0781	2998.305
83	2849.2210	2338.4853	3359.957
84	2659.7889	2148.7809	3170.797
85	2363.1341	1852.4489	2873.819
86	2745.9369	2234.4025	3257.471
87	2440.0672	1929.4383	2950.696
88	2019.5279	1508.9079	2530.148
89	1491.3275	980.5001	2002.155
90	2766.1238	2255.4439	3276.804
91	2648.6440	2137.4355	3159.853
92	2330.5029	1819.7379	2841.268
93	2540.6401	2029.5128	3051.767
94	2626.4849	2115.8352	3137.135
95	3125.4033	2614.5308	3636.276
96	1930.9717	1420.3354	2441.608
97	2055.5290	1544.9591	2566.099
98	2123.2062	1612.1286	2634.284
99	2689.8710	2178.9962	3200.746
100	2055.5290	1544.9591	2566.099
101	2174.6778	1663.9561	2685.400
102	2316.2562	1805.6020	2826.910
103	1879.9819	1369.0631	2390.901
104	2669.6048	2158.5854	3180.624
105	1444.4496	933.6473	1955.252
106	3052.5663	2541.4639	3563.669
108	1998.6489	1487.5006	2509.797
109	2366.5040	1855.8188	2877.189
110	2366.5040	1855.8188	2877.189
112	1972.6499	1462.0563	2483.244
114	3000.8460	2490.0532	3511.639
115	1930.9717	1420.3354	2441.608
116	2780.1891	2268.9118	3291.467
117	2459.2743	1948.5395	2970.009
118	2758.0300	2247.3569	3268.703
119	2055.5290	1544.9591	2566.099
121	2055.5290	1544.9591	2566.099
122	2120.8120	1610.1862	2631.438
123	2633.4727	2122.8854	3144.060
124	3018.8821	2507.8478	3529.916
125	2493.7621	1982.6704	3004.854
126	2440.8134	1930.2338	2951.393

127	2655.6318	2144.4024	3166.861
129	1569.0069	1058.2517	2079.762
130	2241.9467	1731.3559	2752.537
131	2283.6250	1772.8927	2794.357
132	1930.9717	1420.3354	2441.608
133	2242.3550	1731.1427	2753.567
134	2241.9467	1731.3559	2752.537
135	1823.3638	1312.6881	2334.039
136	2316.2562	1805.6020	2826.910
137	2633.4727	2122.8854	3144.060
138	2272.8566	1762.1062	2783.607
139	2612.9110	2101.9546	3123.867
140	2159.0677	1648.4392	2669.696
141	2447.0550	1936.4756	2957.634
143	2633.4727	2122.8854	3144.060
144	2241.9467	1731.3559	2752.537
146	2751.7885	2241.1133	3262.464
147	2366.5040	1855.8188	2877.189
148	2123.7405	1613.1105	2634.370
149	2447.0550	1936.4756	2957.634
151	2272.8566	1762.1062	2783.607
153	2843.8032	2333.0969	3354.509
154	2447.0550	1936.4756	2957.634
156	2856.2088	2345.5493	3366.868
157	2241.9467	1731.3559	2752.537
158	2426.0849	1915.3732	2936.797
159	2655.6318	2144.4024	3166.861
161	1972.6499	1462.0563	2483.244
162	2029.1505	1518.4652	2539.836
163	2459.2743	1948.5395	2970.009
164	2633.4727	2122.8854	3144.060
165	2814.4283	2303.6345	3325.222
166	1848.0926	1337.4418	2358.743
167	2627.2312	2116.6425	3137.820
168	2307.2298	1796.5939	2817.866
169	1569.0069	1058.2517	2079.762
170	2699.0589	2187.5429	3210.575
171	2758.0300	2247.3569	3268.703
172	2545.2338	2034.6405	3055.827
173	2153.7078	1643.1000	2664.315
174	2751.7885	2241.1133	3262.464
175	2630.0193	2119.1805	3140.858
176	2583.8316	2073.0267	3094.636
177	2310.1582	1799.5188	2820.798
178	2741.5913	2230.5001	3252.683
179	2055.5290	1544.9591	2566.099
180	1755.4246	1244.6195	2266.230
181	2241.9467	1731.3559	2752.537
182	2469.2141	1957.9362	2980.492
183	1823.3638	1312.6881	2334.039
184	2627.2312	2116.6425	3137.820
186	2440.8134	1930.2338	2951.393
187	2055.5290	1544.9591	2566.099
188	2758.0300	2247.3569	3268.703
189	2814.4283	2303.6345	3325.222
190	3077.6609	2566.6643	3588.658
191	2010.8455	1500.3227	2521.368
192	2262.5463	1751.9696	2773.123
193	2352.8880	1842.3261	2863.450
194	2197.2632	1686.7227	2707.804
195	2197.2632	1686.7227	2707.804
196	2402.3715	1891.8351	2912.908
197	2079.0570	1568.4833	2589.631
198	1927.9665	1417.4086	2438.524
199	2197.6715	1686.5412	2708.802
200	2974.1986	2463.2455	3485.152
202	2696.9078	2185.8624	3207.953
203	2686.9680	2176.4305	3197.505

204	1886.2882	1375.6967	2396.880
205	1524.3234	1013.6063	2035.040
206	2214.2126	1703.4836	2724.942
207	2692.3765	2181.5983	3203.155
208	2585.3358	2074.5649	3096.107
209	2321.8205	1811.1877	2832.453
214	2321.8205	1811.1877	2832.453
215	3007.8828	2496.8317	3518.934
216	1399.7661	888.9997	1910.532
217	2396.1300	1885.5924	2906.667
218	1927.9665	1417.4086	2438.524
219	2769.7448	2258.9867	3280.503
220	2010.8455	1500.3227	2521.368
221	2696.9078	2185.8624	3207.953
223	2539.3058	2028.7309	3049.881
225	2537.8519	2027.2754	3048.428
226	2594.1977	2083.4141	3104.981
227	2078.5227	1567.5110	2589.534
228	2956.1625	2445.4087	3466.916
229	2076.1286	1565.5586	2586.699
230	2883.3255	2372.3249	3394.326
231	2654.3755	2142.8894	3165.862
232	2568.2275	2057.3339	3079.121
233	2010.8455	1500.3227	2521.368
234	2381.4015	1870.7174	2892.085
235	2271.5727	1760.9585	2782.187
236	2238.9415	1728.2504	2749.633
238	2010.8455	1500.3227	2521.368
239	1886.2882	1375.6967	2396.880
240	2927.4915	2416.6007	3438.382
241	1903.2376	1392.6487	2413.827
242	1803.4092	1292.7919	2314.026
243	2588.7892	2078.2481	3099.330
244	2582.5477	2072.0044	3093.091
246	2500.5503	1990.0010	3011.100
247	3077.6609	2566.6643	3588.658
248	2663.8630	2153.1990	3174.527
249	1710.7411	1199.9774	2221.505
250	2321.8205	1811.1877	2832.453
251	2663.8630	2153.1990	3174.527
252	1886.2882	1375.6967	2396.880
253	2283.2227	1772.5607	2793.885
255	1524.3234	1013.6063	2035.040
256	2214.2126	1703.4836	2724.942
257	2883.3255	2372.3249	3394.326
258	2104.2339	1593.6233	2614.845
259	2010.8455	1500.3227	2521.368
260	2766.6859	2255.7635	3277.608
261	2906.5214	2395.8881	3417.155
262	2500.5503	1990.0010	3011.100
263	2381.4015	1870.7174	2892.085
264	2588.7892	2078.2481	3099.330
265	2089.6553	1579.0306	2600.280
266	2114.3842	1603.7947	2624.974
267	2469.6404	1958.9538	2980.327
268	2567.8192	2057.1270	3078.511
269	2953.1036	2442.1849	3464.022
270	2634.1442	2123.1776	3145.111
271	2228.1731	1717.4868	2738.859
273	2686.9680	2176.4305	3197.505
275	2500.5503	1990.0010	3011.100
276	3080.7198	2569.8884	3591.551
277	2197.2632	1686.7227	2707.804
278	2351.4342	1840.8709	2861.997
279	2713.3465	2202.7218	3223.971
280	1835.2984	1324.4232	2346.174
281	2402.3715	1891.8351	2912.908
282	2129.9943	1619.3358	2640.653

283	2265.4747	1754.8948	2776.055
284	2109.0243	1598.4645	2619.584
285	2811.5253	2300.9152	3322.135
287	1886.2882	1375.6967	2396.880
289	2645.1875	2134.3461	3156.029
290	1667.7035	1156.9858	2178.421
292	2483.4987	1972.8552	2994.142
293	2539.5100	2029.0155	3050.005
294	2670.3089	2159.7356	3180.882
295	2222.4371	1711.9208	2732.953
296	2602.1499	2091.3452	3112.955
297	2359.3339	1848.8441	2869.824
299	1967.8079	1457.3365	2478.279
300	1843.2506	1332.7086	2353.793
301	1760.3715	1249.7925	2270.951
302	1760.3715	1249.7925	2270.951
304	2910.0660	2399.1757	3420.956
307	2840.2879	2329.3392	3351.237
308	2545.7516	2035.2600	3056.243
309	2643.9304	2133.4433	3154.417
310	2542.2982	2031.5989	3052.997
311	2309.8504	1799.3284	2820.372
312	2494.8143	1984.2804	3005.348
313	2913.1249	2402.4125	3423.837
315	2670.3089	2159.7356	3180.882
316	2154.2256	1643.7394	2664.712
317	2171.1750	1660.4874	2681.863
318	2653.8702	2142.8739	3164.866
319	2670.3089	2159.7356	3180.882
321	2768.4876	2257.9299	3279.045
322	3037.6822	2526.8941	3548.470
323	2723.6483	2212.7514	3234.545
324	2353.0923	1842.6006	2863.584
325	1481.2857	970.6119	1991.960
326	1481.2857	970.6119	1991.960
328	2036.0193	1525.5065	2546.532
331	1967.8079	1457.3365	2478.279
332	2071.3465	1560.8000	2581.893
333	1884.9288	1374.4110	2395.447
334	2154.2256	1643.7394	2664.712
335	1860.1999	1349.6477	2370.752
337	1967.8079	1457.3365	2478.279
338	2913.1249	2402.4125	3423.837
339	2964.8452	2453.8479	3475.842
340	2653.8702	2142.8739	3164.866
341	2195.9038	1685.2576	2706.550
342	2620.8254	2110.2060	3131.445
343	2863.4838	2352.9158	3374.052
344	1481.2857	970.6119	1991.960
346	2496.2681	1985.7360	3006.800
347	2071.3465	1560.8000	2581.893
348	2643.9304	2133.4433	3154.417
349	2457.5126	1947.0109	2968.014
350	2154.2256	1643.7394	2664.712
351	2545.7516	2035.2600	3056.243
352	2545.7516	2035.2600	3056.243
353	2643.9304	2133.4433	3154.417
356	2358.9414	1848.3653	2869.517
357	3034.6233	2523.6570	3545.590
358	2768.4876	2257.9299	3279.045
359	2964.8452	2453.8479	3475.842
360	2353.0923	1842.6006	2863.584
362	1884.9288	1374.4110	2395.447
363	2545.7516	2035.2600	3056.243
364	2840.2879	2329.3392	3351.237
365	2768.4876	2257.9299	3279.045
366	1843.2506	1332.7086	2353.793
367	2338.9606	1827.8643	2850.057

```

369 1792.2607 1281.4335 2303.088
371 2353.0923 1842.6006 2863.584
372 2923.9338 2412.6358 3435.232
373 2664.0673 2153.4904 3174.644
374 2228.5350 1717.9648 2739.105
375 1792.2607 1281.4335 2303.088
376 1884.9288 1374.4110 2395.447
377 2726.7072 2215.9877 3237.427
378 2602.1499 2091.3452 3112.955
379 1481.2857 970.6119 1991.960
380 1356.7284 846.0034 1867.453
381 2457.5126 1947.0109 2968.014
382 2620.8254 2110.2060 3131.445
383 2726.7072 2215.9877 3237.427
384 2228.5350 1717.9648 2739.105
385 2353.0923 1842.6006 2863.584
386 2308.3965 1797.8730 2818.920
387 1667.7035 1156.9858 2178.421
388 2171.1750 1660.4874 2681.863
390 2154.2256 1643.7394 2664.712
391 2195.9038 1685.2576 2706.550
392 2664.0673 2153.4904 3174.644
393 2046.6177 1536.0326 2557.203
394 1843.2506 1332.7086 2353.793

```

```

[ reached getOption("max.print") -- omitted 4269 rows ]
> computer_model_exp<- lm(log(price)~speed+hd+ram+screen+trend+multi+ads+premium+cd)
> summary(computer_model_exp)

```

```

Call:
lm(formula = log(price) ~ speed + hd + ram + screen + trend +
    multi + ads + premium + cd)

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-0.52388 -0.07391  0.00262  0.07458  0.50681

```

```

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.835e+00  2.635e-02 259.412  <2e-16 ***
speed        4.251e-03  8.079e-05  52.617  <2e-16 ***
hd           3.404e-04  1.206e-05  28.232  <2e-16 ***
ram          2.086e-02  4.654e-04  44.818  <2e-16 ***
screen       5.422e-02  1.746e-03  31.053  <2e-16 ***
trend       -2.360e-02  2.745e-04 -85.984  <2e-16 ***
multiyes     4.739e-02  4.982e-03   9.512  <2e-16 ***
ads          2.711e-04  2.240e-05  12.102  <2e-16 ***
premiumyes  -2.271e-01  5.388e-03 -42.143  <2e-16 ***
cdyes        4.946e-02  4.154e-03  11.906  <2e-16 ***
---

```

```

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

Residual standard error: 0.1202 on 6249 degrees of freedom
Multiple R-squared:  0.7832, Adjusted R-squared:  0.7829
F-statistic: 2509 on 9 and 6249 DF, p-value: < 2.2e-16

```

```

> confint(computer_model_exp,level = 0.95)

```

```

                2.5 %          97.5 %
(Intercept)  6.7834626381  6.8867666786
speed        0.0040925891  0.0044093424
hd           0.0003167220  0.0003639878
ram          0.0199466176  0.0217713777
screen       0.0507968929  0.0576426391
trend       -0.0241385253 -0.0230623985
multiyes     0.0376236537  0.0571581879
ads          0.0002271916  0.0003150251
premiumyes  -0.2376406267 -0.2165149833
cdyes        0.0413147942  0.0576021800

```

```
> predict(computer_model_exp,interval="predict")
```

	fit	lwr	upr
1	7.585936	7.350063	7.821809
2	7.579927	7.344055	7.815799
3	7.670788	7.434904	7.906671
4	7.927082	7.690981	8.163182
5	7.958744	7.722790	8.194697
6	8.099026	7.863039	8.335012
7	7.666026	7.429980	7.902072
8	7.652194	7.416316	7.888071
9	7.819892	7.584028	8.055756
10	7.790676	7.554800	8.026552
11	7.788231	7.552357	8.024106
12	7.887908	7.652012	8.123803
13	7.709228	7.473362	7.945093
14	7.725530	7.489664	7.961397
15	7.820573	7.584709	8.056436
16	7.709228	7.473362	7.945093
17	7.579927	7.344055	7.815799
18	7.718409	7.482532	7.954286
19	7.732024	7.496139	7.967908
20	7.970273	7.734349	8.206198
21	7.636961	7.401100	7.872822
22	7.777243	7.541345	8.013142
23	7.924736	7.688773	8.160699
24	7.899115	7.663076	8.135155
25	7.902258	7.666359	8.138157
26	7.578226	7.342353	7.814098
27	7.636961	7.401100	7.872822
28	7.829992	7.594090	8.065893
29	7.958744	7.722790	8.194697
30	7.899820	7.663929	8.135711
31	7.700034	7.463999	7.936069
32	7.602954	7.367084	7.838823
33	7.910285	7.674253	8.146316
34	7.790676	7.554800	8.026552
35	7.650575	7.414714	7.886437
36	7.858691	7.622788	8.094594
37	7.887908	7.652012	8.123803
38	7.986610	7.750664	8.222557
39	7.819892	7.584028	8.055756
40	7.819892	7.584028	8.055756
41	7.831805	7.595944	8.067665
42	8.040830	7.804886	8.276774
43	7.748306	7.512447	7.984166
44	7.747626	7.511766	7.983486
45	8.031010	7.795054	8.266966
46	7.759538	7.523681	7.995395
47	7.636961	7.401100	7.872822
48	7.599550	7.363681	7.835419
49	7.737137	7.501268	7.973005
50	7.677804	7.441930	7.913677
51	7.650575	7.414714	7.886437
52	7.636961	7.401100	7.872822
53	7.986373	7.750481	8.222266
54	7.664190	7.428324	7.900055
55	7.975384	7.739293	8.211476
56	7.709228	7.473362	7.945093
57	7.777243	7.541345	8.013142
58	7.967131	7.731072	8.203190
59	8.050567	7.814523	8.286611
60	7.709228	7.473362	7.945093
61	7.982970	7.747078	8.218861
62	7.704795	7.468922	7.940668
63	7.815460	7.579595	8.051324
64	7.727262	7.491223	7.963302
65	7.720209	7.484298	7.956120
66	7.616568	7.380698	7.852438

67	7.777243	7.541345	8.013142
68	7.599550	7.363681	7.835419
69	7.664870	7.429005	7.900736
70	7.899820	7.663929	8.135711
71	8.036069	7.800010	8.272128
72	7.826849	7.590800	8.062898
73	7.650575	7.414714	7.886437
74	7.831805	7.595944	8.067665
75	7.722842	7.486977	7.958707
76	7.759538	7.523681	7.995395
77	7.747626	7.511766	7.983486
78	8.035832	7.799812	8.271852
79	7.709228	7.473362	7.945093
80	7.896450	7.660327	8.132572
81	7.865498	7.629593	8.101404
82	7.759538	7.523681	7.995395
83	7.942127	7.706232	8.178023
84	7.864918	7.628909	8.100927
85	7.725530	7.489664	7.961397
86	7.944072	7.707966	8.180177
87	7.747626	7.511766	7.983486
88	7.636961	7.401100	7.872822
89	7.545920	7.310040	7.781800
90	7.860735	7.624871	8.096599
91	7.899115	7.663076	8.135155
92	7.777243	7.541345	8.013142
93	7.837690	7.601663	8.073716
94	7.819892	7.584028	8.055756
95	8.075696	7.839722	8.311671
96	7.593238	7.357381	7.829095
97	7.627246	7.391399	7.863094
98	7.676705	7.440688	7.912722
99	7.901407	7.665453	8.137361
100	7.627246	7.391399	7.863094
101	7.654475	7.418617	7.890332
102	7.702201	7.466347	7.938055
103	7.696880	7.460984	7.932776
104	7.876205	7.640294	8.112115
105	7.522590	7.286723	7.758458
106	8.040852	7.804830	8.276873
107	7.797243	7.561393	8.033094
108	7.642697	7.406669	7.878725
109	7.767528	7.531647	8.003409
110	7.767528	7.531647	8.003409
111	7.963044	7.727169	8.198919
112	7.613632	7.377784	7.849480
113	7.878929	7.643049	8.114808
114	8.007681	7.771736	8.243626
115	7.593238	7.357381	7.829095
116	7.957416	7.721371	8.193461
117	7.780961	7.545096	8.016826
118	7.878192	7.642317	8.114068
119	7.627246	7.391399	7.863094
120	7.647667	7.411814	7.883521
121	7.627246	7.391399	7.863094
122	7.640860	7.405010	7.876711
123	7.810177	7.574331	8.046023
124	8.012503	7.776505	8.248501
125	7.814360	7.578350	8.050371
126	7.736209	7.500364	7.972053
127	7.889400	7.653373	8.125428
128	7.736209	7.500364	7.972053
129	7.556598	7.320739	7.792457
130	7.699513	7.463662	7.935363
131	7.753914	7.518030	7.989797
132	7.593238	7.357381	7.829095
133	7.703933	7.467914	7.939952
134	7.699513	7.463662	7.935363

135	7.576221	7.340363	7.812078
136	7.702201	7.466347	7.938055
137	7.810177	7.574331	8.046023
138	7.708694	7.472826	7.944563
139	7.841589	7.605598	8.077580
140	7.685898	7.450046	7.921750
141	7.737911	7.502066	7.973755
142	8.012740	7.776706	8.248773
143	7.810177	7.574331	8.046023
144	7.699513	7.463662	7.935363
145	7.946944	7.711040	8.182848
146	7.876491	7.640615	8.112367
147	7.767528	7.531647	8.003409
148	7.641541	7.405690	7.877392
149	7.737911	7.502066	7.973755
150	8.017501	7.781579	8.253423
151	7.708694	7.472826	7.944563
152	7.792130	7.556279	8.027981
153	7.905421	7.669545	8.141296
154	7.737911	7.502066	7.973755
155	7.724977	7.489129	7.960825
156	7.932412	7.696538	8.168287
157	7.699513	7.463662	7.935363
158	7.764902	7.529039	8.000765
159	7.889400	7.653373	8.125428
160	7.842169	7.606282	8.078056
161	7.613632	7.377784	7.849480
162	7.647458	7.411588	7.883328
163	7.780961	7.545096	8.016826
164	7.810177	7.574331	8.046023
165	7.935414	7.699470	8.171358
166	7.579624	7.343767	7.815481
167	7.808475	7.572629	8.044322
168	7.713127	7.477274	7.948979
169	7.556598	7.320739	7.792457
170	7.920742	7.684650	8.156835
171	7.878192	7.642317	8.114068
172	7.792130	7.556279	8.027981
173	7.681466	7.445607	7.917325
174	7.876491	7.640615	8.112367
175	7.806662	7.570779	8.042546
176	7.848976	7.613086	8.084866
177	7.713807	7.477955	7.949660
178	7.900570	7.664556	8.136583
179	7.627246	7.391399	7.863094
180	7.628864	7.393001	7.864728
181	7.699513	7.463662	7.935363
182	7.817134	7.581095	8.053173
183	7.576221	7.340363	7.812078
184	7.808475	7.572629	8.044322
185	7.963281	7.727356	8.199207
186	7.736209	7.500364	7.972053
187	7.627246	7.391399	7.863094
188	7.878192	7.642317	8.114068
189	7.935414	7.699470	8.171358
190	8.075337	7.839335	8.311340
191	7.605001	7.369171	7.840831
192	7.690882	7.455049	7.926715
193	7.703072	7.467241	7.938904
194	7.677268	7.441436	7.913099
195	7.677268	7.441436	7.913099
196	7.715666	7.479838	7.951493
197	7.619296	7.383463	7.855129
198	7.591387	7.355555	7.827219
199	7.681688	7.445694	7.917683
200	7.990258	7.754286	8.226229
201	7.924699	7.688818	8.160580
202	7.878325	7.642329	8.114320

203	7.842152	7.606321	8.077982
204	7.570993	7.335153	7.806833
205	7.534353	7.298511	7.770195
206	7.728265	7.492399	7.964132
207	7.882939	7.647066	8.118812
208	7.784417	7.548555	8.020280
209	7.745283	7.509422	7.981144
210	7.995256	7.759358	8.231154
211	7.713964	7.478136	7.949792
212	8.018607	7.782605	8.254608
213	7.792115	7.556126	8.028105
214	7.745283	7.509422	7.981144
215	8.018607	7.782605	8.254608
216	7.500345	7.264494	7.736197
217	7.713964	7.478136	7.949792
218	7.591387	7.355555	7.827219
219	7.913170	7.677239	8.149100
220	7.605001	7.369171	7.840831
221	7.878325	7.642329	8.114320
222	7.910167	7.674312	8.146023
223	7.775339	7.539506	8.011172
224	7.856684	7.620826	8.092541
225	7.774999	7.539165	8.010832
226	7.828719	7.592845	8.064593
227	7.654460	7.418466	7.890454
228	7.985436	7.749505	8.221367
229	7.618615	7.382783	7.854448
230	7.950591	7.714607	8.186575
231	7.898497	7.662423	8.134571
232	7.819344	7.583376	8.055312
233	7.605001	7.369171	7.840831
234	7.742657	7.506809	7.978505
235	7.679956	7.444118	7.915795
236	7.731669	7.495804	7.967534
237	7.625213	7.389360	7.861066
238	7.605001	7.369171	7.840831
239	7.570993	7.335153	7.806833
240	7.941036	7.705135	8.176938
241	7.587983	7.352151	7.823816
242	7.557379	7.321538	7.793220
243	7.787932	7.552104	8.023760
244	7.786230	7.550401	8.022059
245	7.855947	7.620091	8.091804
246	7.769885	7.534051	8.005719
247	8.075337	7.839335	8.311340
248	7.843354	7.607491	8.079217
249	7.606619	7.370774	7.842465
250	7.745283	7.509422	7.981144
251	7.843354	7.607491	8.079217
252	7.570993	7.335153	7.806833
253	7.688437	7.452596	7.924278
254	7.620452	7.384446	7.856458
255	7.534353	7.298511	7.770195
256	7.728265	7.492399	7.964132
257	7.950591	7.714607	8.186575
258	7.625423	7.389587	7.861258
259	7.605001	7.369171	7.840831
260	7.935056	7.699079	8.171032
261	7.940799	7.704946	8.176653
262	7.769885	7.534051	8.005719
263	7.742657	7.506809	7.978505
264	7.787932	7.552104	8.023760
265	7.660250	7.424414	7.896085
266	7.663653	7.427819	7.899488
267	7.760704	7.524860	7.996547
268	7.814923	7.579077	8.050770
269	8.007322	7.771346	8.243298
270	7.857363	7.621473	8.093254

271	7.686449	7.450601	7.922298
272	7.990495	7.754491	8.226498
273	7.842152	7.606321	8.077982
274	7.913170	7.677239	8.149100
275	7.769885	7.534051	8.005719
276	8.053451	7.817492	8.289411
277	7.677268	7.441436	7.913099
278	7.702732	7.466900	7.938564
279	7.855947	7.620091	8.091804
280	7.674635	7.438758	7.910512
281	7.715666	7.479838	7.951493
282	7.632230	7.396391	7.868068
283	7.691563	7.455729	7.927396
284	7.659221	7.423380	7.895062
285	7.910167	7.674312	8.146023
286	7.854246	7.618388	8.090103
287	7.570993	7.335153	7.806833
288	7.787932	7.552104	8.023760
289	7.879162	7.643220	8.115103
290	7.585188	7.349362	7.821013
291	7.903268	7.667411	8.139125
292	7.801896	7.566052	8.037740
293	7.764799	7.528989	8.000608
294	7.834516	7.598679	8.070352
295	7.670131	7.434319	7.905943
296	7.857730	7.621804	8.093657
297	7.694234	7.458425	7.930043
298	7.891738	7.655822	8.127654
299	7.583570	7.347759	7.819380
300	7.549562	7.313741	7.785383
301	7.535948	7.300125	7.771771
302	7.535948	7.300125	7.771771
303	7.583570	7.347759	7.819380
304	7.985890	7.749929	8.221851
305	7.764799	7.528989	8.000608
306	7.549562	7.313741	7.785383
307	7.929160	7.693196	8.165123
308	7.766500	7.530692	8.002309
309	7.820720	7.584909	8.056531
310	7.762986	7.527146	7.998826
311	7.681641	7.445827	7.917455
312	7.753567	7.517752	7.989382
313	7.964004	7.728089	8.199919
314	7.835252	7.599418	8.071086
315	7.834516	7.598679	8.070352
316	7.655836	7.420025	7.891647
317	7.706834	7.470988	7.942680
318	7.856893	7.620917	8.092869
319	7.834516	7.598679	8.070352
320	7.723851	7.488011	7.959692
321	7.888736	7.652901	8.124570
322	8.032020	7.796078	8.267962
323	7.913624	7.677661	8.149587
324	7.692532	7.456722	7.928342
325	7.512921	7.277098	7.748745
326	7.512921	7.277098	7.748745
327	7.694234	7.458425	7.930043
328	7.597865	7.362052	7.833677
329	8.032020	7.796078	8.267962
330	7.661614	7.425788	7.897440
331	7.583570	7.347759	7.819380
332	7.642222	7.406407	7.878037
333	7.569955	7.334142	7.805768

[reached getOption("max.print") -- omitted 5926 rows]

```
> computer_model_quad<- lm(price~speed+I(speed^2)+hd+I(hd^2)+ram+I(ram^2)+screen+I(screen^2)+ads+I(ads^2)+trend+I(trend))
> summary(computer_model_quad)
```



```
call:
lm(formula = price ~ speed + I(speed^2) + hd + I(hd^2) + ram +
    I(ram^2) + screen + I(screen^2) + ads + I(ads^2) + trend +
    I(trend))
```

Residuals:

	Min	1Q	Median	3Q	Max
	-990.80	-183.05	-35.66	127.39	1822.94

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.195e+04	1.042e+03	11.469	< 2e-16 ***
speed	1.890e+01	9.199e-01	20.545	< 2e-16 ***
I(speed^2)	-8.573e-02	7.609e-03	-11.268	< 2e-16 ***
hd	1.211e+00	7.254e-02	16.693	< 2e-16 ***
I(hd^2)	-3.738e-04	4.972e-05	-7.519	6.32e-14 ***
ram	5.777e+01	3.536e+00	16.340	< 2e-16 ***
I(ram^2)	-4.200e-01	1.295e-01	-3.242	0.00119 **
screen	-1.522e+03	1.365e+02	-11.152	< 2e-16 ***
I(screen^2)	5.328e+01	4.433e+00	12.017	< 2e-16 ***
ads	1.877e+00	2.753e-01	6.815	1.03e-11 ***
I(ads^2)	-2.381e-03	6.613e-04	-3.601	0.00032 ***
trend	-4.724e+01	6.855e-01	-68.919	< 2e-16 ***
I(trend)	NA	NA	NA	NA

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 299.9 on 6247 degrees of freedom
Multiple R-squared: 0.7339, Adjusted R-squared: 0.7334
F-statistic: 1566 on 11 and 6247 DF, p-value: < 2.2e-16

```
> confint(computer_model_quad, level = 0.95)
```

	2.5 %	97.5 %
(Intercept)	9.903735e+03	1.398742e+04
speed	1.709616e+01	2.070278e+01
I(speed^2)	-1.006500e-01	-7.081831e-02
hd	1.068781e+00	1.353199e+00
I(hd^2)	-4.712545e-04	-2.763331e-04
ram	5.084065e+01	6.470300e+01
I(ram^2)	-6.739107e-01	-1.660622e-01
screen	-1.789703e+03	-1.254559e+03
I(screen^2)	4.458555e+01	6.196719e+01
ads	1.336760e+00	2.416249e+00
I(ads^2)	-3.677696e-03	-1.084835e-03
trend	-4.858782e+01	-4.590017e+01
I(trend)	NA	NA

```
> predict(computer_model_quad, interval="predict")
```

	fit	lwr	upr
1	1923.775	1335.1670	2512.383
2	1930.433	1341.8526	2519.013
3	2047.238	1458.4113	2636.064
4	2235.282	1646.6035	2823.960
5	2901.694	2312.9092	3490.480
6	3245.284	2656.4398	3834.127
7	2024.354	1435.7534	2612.954
8	2130.753	1542.1217	2719.385
9	2589.775	2001.2325	3178.318
10	2401.731	1813.0303	2990.431
11	2369.581	1780.8581	2958.303
12	2733.044	2144.4348	3321.653
13	2292.135	1703.6197	2880.651
14	2314.472	1725.8396	2903.104
15	2591.882	2003.3408	3180.422
16	2292.135	1703.6197	2880.651
17	1930.433	1341.8526	2519.013
18	2201.411	1612.6766	2790.145
19	2242.972	1654.1670	2831.778
20	2966.220	2377.4522	3554.988

21	2091.815	1503.3346	2680.295
22	2435.404	1846.8026	3024.006
23	2790.279	2201.3789	3379.180
24	2767.156	2178.1160	3356.197
25	2822.951	2234.2248	3411.678
26	1924.686	1336.1077	2513.265
27	2091.815	1503.3346	2680.295
28	2622.631	2033.8669	3211.395
29	2901.694	2312.9092	3490.480
30	2769.476	2180.8925	3358.059
31	2135.769	1547.2746	2724.263
32	1980.400	1391.8204	2568.979
33	2777.764	2188.7281	3366.800
34	2401.731	1813.0303	2990.431
35	2135.769	1547.2746	2724.263
36	2545.000	1956.2449	3133.755
37	2733.044	2144.4348	3321.653
38	3007.267	2418.4096	3596.124
39	2589.775	2001.2325	3178.318
40	2589.775	2001.2325	3178.318
41	2626.207	2037.6861	3214.728
42	3030.151	2441.2328	3619.068
43	2391.561	1803.0331	2980.090
44	2389.455	1800.9252	2977.985
45	3102.015	2513.2273	3690.802
46	2425.887	1837.3703	3014.403
47	2091.815	1503.3346	2680.295
48	1969.224	1380.6445	2557.804
49	2380.954	1792.3960	2969.511
50	2220.089	1631.4743	2808.703
51	2135.769	1547.2746	2724.263
52	2091.815	1503.3346	2680.295
53	2886.630	2297.9476	3475.313
54	2178.527	1589.9859	2767.068
55	2391.561	1803.0331	2980.090
56	2292.135	1703.6197	2880.651
57	2435.404	1846.8026	3024.006
58	2910.425	2321.3316	3499.519
59	3121.353	2532.3115	3710.395
60	2292.135	1703.6197	2880.651
61	2877.025	2288.3502	3465.699
62	2158.653	1569.9635	2747.342
63	2453.900	1865.2400	3042.561
64	2220.089	1631.4743	2808.703
65	2274.022	1685.2911	2862.753
66	2024.354	1435.7534	2612.954
67	2435.404	1846.8026	3024.006
68	1969.224	1380.6445	2557.804
69	2180.633	1592.0893	2769.178
70	2769.476	2180.8925	3358.059
71	3007.267	2418.4096	3596.124
72	2566.836	1977.7586	3155.914
73	2135.769	1547.2746	2724.263
74	2626.207	2037.6861	3214.728
75	2336.089	1747.5705	2924.608
76	2425.887	1837.3703	3014.403
77	2389.455	1800.9252	2977.985
78	2886.630	2297.9476	3475.313
79	2292.135	1703.6197	2880.651
80	2134.703	1545.7909	2723.615
81	2565.930	1977.1499	3154.710
82	2425.887	1837.3703	3014.403
83	2755.928	2167.2418	3344.614
84	2453.900	1865.2400	3042.561
85	2314.472	1725.8396	2903.104
86	2291.567	1702.8819	2880.253
87	2389.455	1800.9252	2977.985
88	2091.815	1503.3346	2680.295

89	1819.018	1230.3465	2407.689
90	2710.872	2122.3214	3299.423
91	2767.156	2178.1160	3356.197
92	2435.404	1846.8026	3024.006
93	2369.581	1780.8581	2958.303
94	2589.775	2001.2325	3178.318
95	3199.466	2610.6563	3788.276
96	1978.536	1389.9766	2567.096
97	2089.951	1501.4976	2678.405
98	2089.951	1501.4976	2678.405
99	2744.462	2155.5925	3333.331
100	2089.951	1501.4976	2678.405
101	2174.271	1585.7079	2762.834
102	2268.654	1680.0573	2857.251
103	2228.205	1639.5145	2816.895
104	2620.279	2031.3581	3209.200
105	1773.200	1184.5670	2361.834
106	3117.097	2528.1314	3706.063
107	2546.064	1957.5549	3134.573
108	1978.536	1389.9766	2567.096
109	2433.541	1844.9846	3022.097
110	2433.541	1844.9846	3022.097
111	2840.813	2252.1816	3429.443
112	2045.997	1457.5519	2634.443
113	2777.134	2188.4662	3365.801
114	3056.197	2467.4416	3644.953
115	1978.536	1389.9766	2567.096
116	2906.170	2317.0805	3495.259
117	2397.475	1808.7669	2986.183
118	2728.788	2140.2453	3317.331
119	2089.951	1501.4976	2678.405
120	2153.640	1565.1136	2742.166
121	2089.951	1501.4976	2678.405
122	2132.709	1544.2143	2721.204
123	2585.519	1997.0362	3174.002
124	2840.813	2252.1816	3429.443
125	2323.763	1735.0678	2912.458
126	2380.069	1791.5878	2968.551
127	2762.901	2173.8581	3351.943
128	2380.069	1791.5878	2968.551
129	1884.616	1296.0729	2473.158
130	2290.272	1701.7943	2878.749
131	2389.587	1801.0230	2978.150
132	1978.536	1389.9766	2567.096
133	2174.271	1585.7079	2762.834
134	2290.272	1701.7943	2878.749
135	1923.407	1334.8605	2511.953
136	2268.654	1680.0573	2857.251
137	2585.519	1997.0362	3174.002
138	2197.155	1608.4026	2785.907
139	2408.083	1819.4602	2996.705
140	2246.318	1657.8378	2834.797
141	2385.199	1796.7183	2973.680
142	2961.449	2372.6575	3550.241
143	2585.519	1997.0362	3174.002
144	2290.272	1701.7943	2878.749
145	2920.403	2331.6958	3509.110
146	2723.658	2135.1131	3312.204
147	2433.541	1844.9846	3022.097
148	2134.816	1546.3180	2723.314
149	2385.199	1796.7183	2973.680
150	2984.333	2395.4828	3573.183
151	2197.155	1608.4026	2785.907
152	2408.083	1819.4602	2996.705
153	2808.323	2219.7679	3396.879
154	2385.199	1796.7183	2973.680
155	2345.744	1757.2463	2934.241
156	2751.672	2163.0564	3340.287

157	2290.272	1701.7943	2878.749
158	2323.763	1735.0678	2912.458
159	2762.901	2173.8581	3351.943
160	2520.113	1931.3860	3108.839
161	2045.997	1457.5519	2634.443
162	2001.420	1412.6365	2590.203
163	2397.475	1808.7669	2986.183
164	2585.519	1997.0362	3174.002
165	2855.877	2267.1226	3444.631
166	1934.582	1346.0379	2523.127
167	2580.389	1991.9044	3168.874
168	2333.030	1744.5213	2921.538
169	1884.616	1296.0729	2473.158
170	2245.750	1657.0824	2834.418
171	2728.788	2140.2453	3317.331
172	2408.083	1819.4602	2996.705
173	2112.835	1524.1886	2701.482
174	2723.658	2135.1131	3312.204
175	2576.814	1988.1075	3165.520
176	2540.744	1951.9884	3129.500
177	2335.136	1746.6255	2923.647
178	2773.508	2184.5306	3362.486
179	2089.951	1501.4976	2678.405
180	2084.936	1496.3428	2673.528
181	2290.272	1701.7943	2878.749
182	2562.580	1973.4901	3151.671
183	1923.407	1334.8605	2511.953
184	2580.389	1991.9044	3168.874
185	2961.449	2372.6575	3550.241
186	2380.069	1791.5878	2968.551
187	2089.951	1501.4976	2678.405
188	2728.788	2140.2453	3317.331
189	2855.877	2267.1226	3444.631
190	3087.896	2498.9681	3676.824
191	2049.768	1461.3786	2638.158
192	2292.846	1704.4084	2881.284
193	2306.613	1718.1697	2895.056
194	2250.088	1661.6749	2838.502
195	2250.088	1661.6749	2838.502
196	2345.016	1756.5945	2933.437
197	2094.633	1506.2059	2683.060
198	2005.814	1417.4260	2594.202
199	2134.088	1545.6016	2722.574
200	2800.629	2212.0722	3389.186
201	2880.220	2291.5965	3468.843
202	2733.325	2144.4110	3322.239
203	2568.220	1979.7038	3156.736
204	1938.353	1349.8579	2526.848
205	1844.432	1255.9501	2432.915
206	2338.228	1749.7113	2926.744
207	2627.169	2038.4997	3215.838
208	2536.630	1948.0088	3125.252
209	2393.357	1804.8650	2981.850
210	2944.150	2355.3907	3532.909
211	2339.886	1751.4632	2928.309
212	3076.914	2488.0112	3665.817
213	2283.580	1694.9338	2872.226
214	2393.357	1804.8650	2981.850
215	3076.914	2488.0112	3665.817
216	1733.017	1144.4445	2321.590
217	2339.886	1751.4632	2928.309
218	2005.814	1417.4260	2594.202
219	2815.694	2226.9962	3404.391
220	2049.768	1461.3786	2638.158
221	2733.325	2144.4110	3322.239
222	2711.489	2122.9345	3300.043
223	2506.933	1918.4780	3095.388
224	2736.951	2148.3671	3325.534

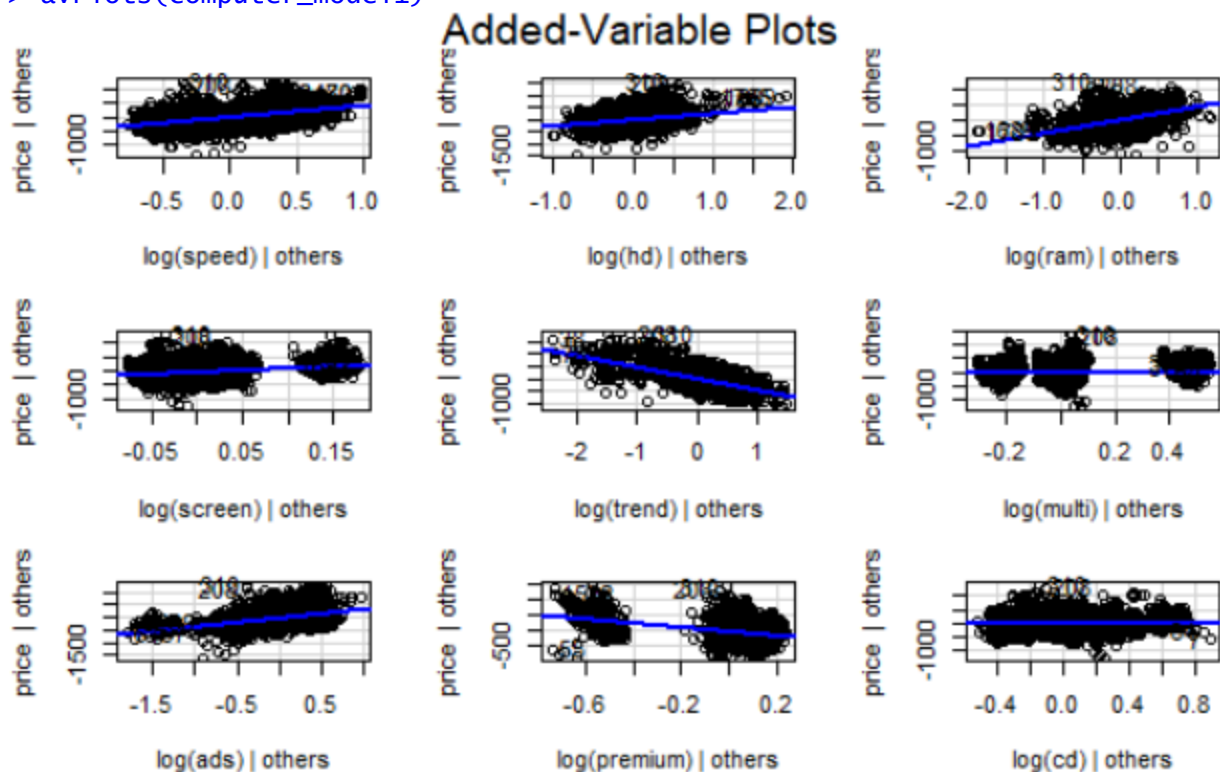
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229	2092.526	1504.1019	2680.951
230	2933.645	2344.7796	3522.511
231	2205.567	1616.9370	2794.196
232	2367.900	1779.3390	2956.460
233	2049.768	1461.3786	2638.158
234	2283.580	1694.9338	2872.226
235	2228.471	1639.9330	2817.009
236	2349.403	1760.8964	2937.910
237	1961.237	1372.5204	2549.953
238	2049.768	1461.3786	2638.158
239	1938.353	1349.8579	2526.848
240	2921.266	2332.5628	3509.969
241	1994.639	1406.2450	2583.033
242	1894.399	1305.9123	2482.886
243	2545.336	1956.9118	3133.760
244	2540.206	1951.7794	3128.633
245	2688.605	2100.1209	3277.089
246	2367.900	1779.3390	2956.460
247	3087.896	2498.9681	3676.824
248	2650.202	2061.6828	3238.721
249	2044.752	1456.2195	2633.285
250	2393.357	1804.8650	2981.850
251	2650.202	2061.6828	3238.721
252	1938.353	1349.8579	2526.848
253	2260.696	1672.1930	2849.199
254	1938.353	1349.8579	2526.848
255	1844.432	1255.9501	2432.915
256	2338.228	1749.7113	2926.744
257	2933.645	2344.7796	3522.511
258	2113.457	1525.0043	2701.909
259	2049.768	1461.3786	2638.158
260	2744.307	2155.3974	3333.217
261	2800.629	2212.0722	3389.186
262	2367.900	1779.3390	2956.460
263	2283.580	1694.9338	2872.226
264	2545.336	1956.9118	3133.760
265	2194.959	1606.5276	2783.390
266	2206.134	1617.7114	2794.557
267	2461.016	1872.4903	3049.542
268	2483.900	1895.2786	3072.521
269	2944.627	2355.7422	3533.512
270	2589.701	2000.8467	3178.556
271	2156.972	1568.2989	2745.644
272	2921.266	2332.5628	3509.969
273	2568.220	1979.7038	3156.736
274	2815.694	2226.9962	3404.391
275	2367.900	1779.3390	2956.460
276	3159.283	2570.5293	3748.036
277	2250.088	1661.6749	2838.502
278	2305.561	1717.1166	2894.005
279	2688.605	2100.1209	3277.089
280	2188.021	1599.3910	2776.652
281	2345.016	1756.5945	2933.437
282	2134.088	1545.6016	2722.574
283	2294.953	1706.5129	2883.393
284	2072.652	1484.0722	2661.232
285	2711.489	2122.9345	3300.043
286	2683.475	2094.9879	3271.963
287	1938.353	1349.8579	2526.848
288	2545.336	1956.9118	3133.760
289	2704.279	2115.4664	3293.091
290	2008.558	1420.0912	2597.025
291	2844.025	2255.4933	3432.557
292	2454.088	1865.5095	3042.667

```

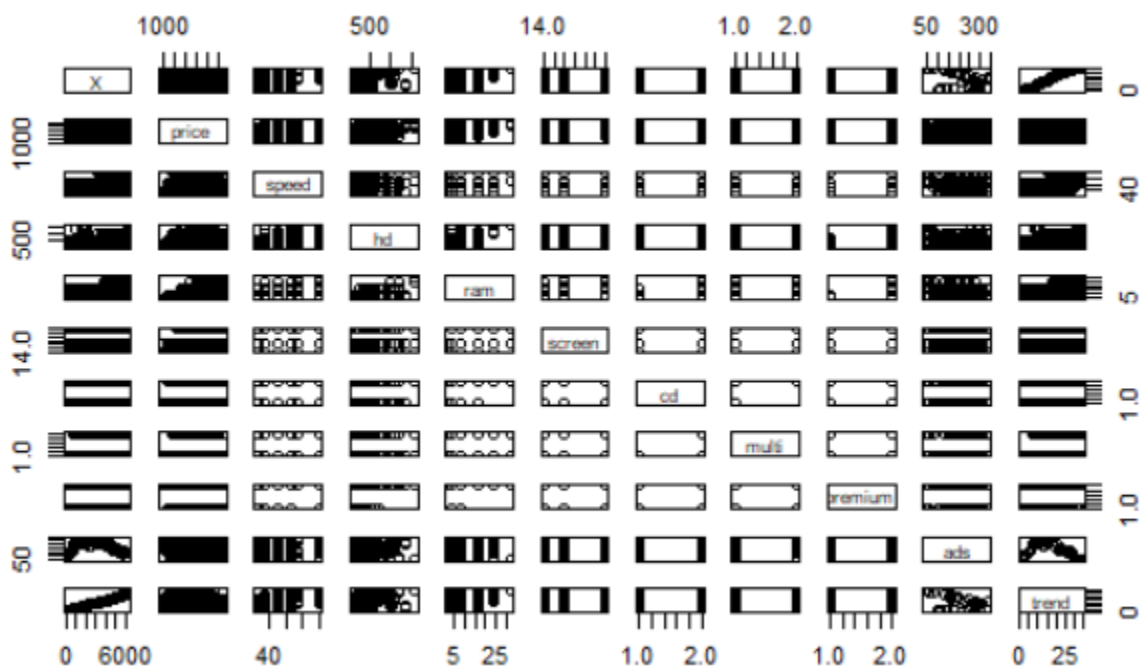
293 2504.012 1915.6499 3092.374
294 2652.411 2063.9906 3240.831
295 2258.758 1670.3969 2847.120
296 2668.084 2079.3386 3256.830
297 2308.822 1720.4672 2897.176
298 2779.499 2190.8679 3368.131
299 2013.574 1425.2563 2601.891
300 1902.159 1313.7360 2490.581
301 1858.205 1269.7827 2446.627
302 1858.205 1269.7827 2446.627
303 2013.574 1425.2563 2601.891
304 2908.433 2319.6010 3497.264
305 2504.012 1915.6499 3092.374
306 1902.159 1313.7360 2490.581
307 2897.451 2308.6556 3486.246
308 2509.142 1920.7832 3097.500
309 2532.025 1943.5780 3120.473
310 2500.436 1911.9086 3088.963
311 2270.418 1682.0361 2858.801
312 2469.686 1881.2897 3058.083
313 2979.819 2391.1850 3568.454
314 2700.756 2112.2655 3289.247
315 2652.411 2063.9906 3240.831
316 2213.894 1625.5512 2802.237
317 2302.034 1713.5762 2890.491
318 2697.131 2108.2883 3285.973
319 2652.411 2063.9906 3240.831
320 2357.163 1768.7397 2945.586
321 2675.294 2086.8071 3263.782
322 3123.088 2534.3980 3711.779
323 2708.113 2119.2575 3296.968
324 2303.692 1715.3351 2892.048
325 1808.238 1219.8231 2396.653
[ reached getOption("max.print") -- omitted 5926 rows ]

```

```
> avPlots(computer_model1)
```

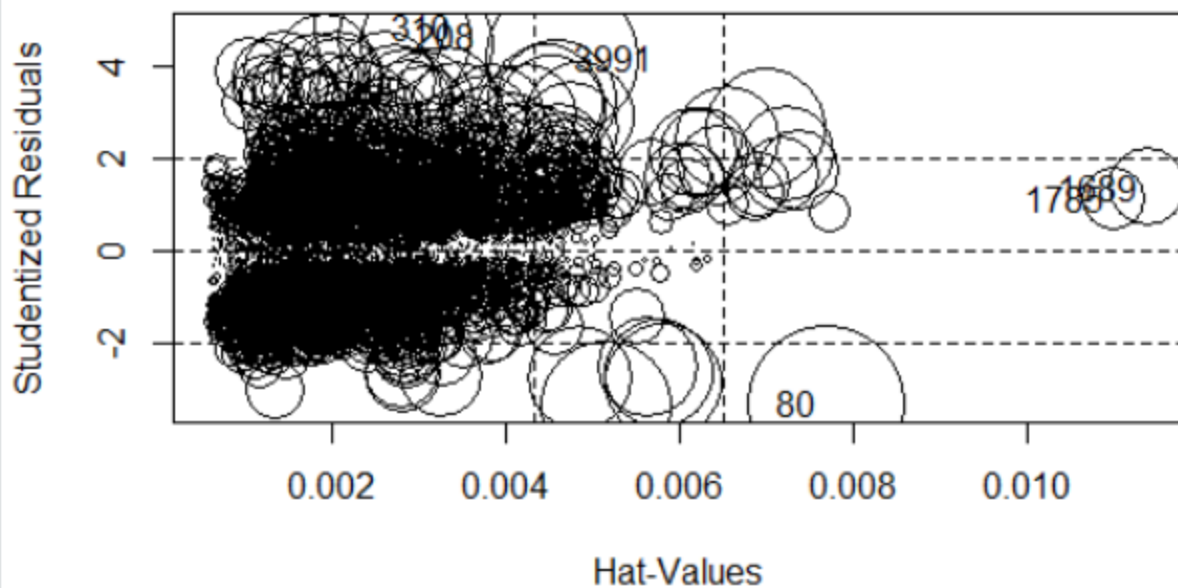


```
> pairs(computer)
```



```
> influencePlot(computer_model2)
```

	StudRes	Hat	CookD
80	-3.349588	0.007711172	0.008699608
208	4.666753	0.002839494	0.006173688
310	4.832932	0.002558010	0.005961103
1689	1.364255	0.011408617	0.002147462
1785	1.128212	0.011008761	0.001416779
3991	4.188612	0.004672884	0.008207249



```
> vif(computer_model1)
```

speed	hd	ram	screen	trend	multi	ads	premium	cd
1.265364	4.207395	2.974628	1.081644	2.022790	1.290568	1.217218	1.109388	1.859370

```
> vif(computer_model2)
```

log(speed)	log(hd)	log(ram)	screen	trend	multi	ads
1.249865	4.974189	3.693815	1.091764	2.078391	1.290151	1.110070

premium	cd
1.123071	1.853939

Conclusion- p-value is less than 0.05. and Multiple R- squared value is 0.7832.
This means the regression model will predict the output 78.32% time correct
Residual standard error: 0.1202 on 6249 degrees of freedom

Problem statement 3

Consider only the below columns and prepare a prediction model for predicting Price.

```
Corolla<-
```

```
Corolla[c("Price","Age_08_04","KM","HP","cc","Doors","Gears","Quarterly_Tax","Weight")]
```

Answer:

Rcode:

```
toyota <- read.csv(file.choose())
```

```
View(toyota)
```

```
toyota<-
```

```
toyota[,c("Price","Age_08_04","KM","HP","cc","Doors","Gears","Quarterly_Tax","Weight")]
```

```
View(toyota)
```

```
attach(toyota)
```

```
qqnorm(Price)
```

```
qqnorm(Age_08_04)
```

```
qqnorm(KM)
```

```
qqnorm(HP)
```

```
qqnorm(cc)
```

```
qqnorm(Doors)
```

```
qqnorm(Gears)
```

```
qqnorm(Quarterly_Tax)
```

```
qqnorm(Weight)
```

```
summary(toyota)
```

```
boxplot(Price)
```

```
boxplot(Age_08_04)
```

```
boxplot(KM)
```

```
boxplot(HP)
boxplot(cc)
boxplot(Doors)
boxplot(Gears)
boxplot(Quarterly_Tax)
boxplot(Weight)
hist(Price)
hist(Age_08_04)
hist(KM)
hist(HP)
hist(cc)
hist(Doors)
hist(Gears)
hist(Quarterly_Tax)
hist(Weight)
library(e1071)
skewness(Price)
skewness(Age_08_04)
skewness(KM)
skewness(HP)
skewness(cc)
skewness(Doors)
skewness(Gears)
skewness(Quarterly_Tax)
skewness(Weight)
skewness(Weight)
```

```
boxplot(Price)$out  
boxplot(Price,plot = FALSE)$out  
outliers <- boxplot(Price,plot = FALSE)$out  
print(outliers)  
toyota[which(toyota$Price %in% outliers),]  
toyota <-toyota[-which(Price %in% outliers),]
```

```
boxplot(KM)$out  
boxplot(KM,plot = FALSE)$out  
outlier1 <- boxplot(KM,plot = FALSE)$out  
print(outlier1)  
toyota[which(KM %in% outliers),]  
toyota <-toyota[-which(KM %in% outliers),]
```

```
boxplot(cc)$out  
boxplot(cc,plot = FALSE)$out  
outliers <- boxplot(cc,plot = FALSE)$out  
print(outliers)  
toyota[which(cc %in% outliers),]  
toyota <-toyota[-which(toyota$cc %in% outliers),]
```

```
boxplot(Gears)$out  
boxplot(Gears,plot = FALSE)$out  
outliers <- boxplot(Gears,plot = FALSE)$out  
print(outliers)  
toyota[which(toyota$Gears %in% outliers),]  
toyota <-toyota[-which(toyota$Gears %in% outliers),]
```

```
boxplot(Quarterly_Tax)$out
boxplot(Quarterly_Tax,plot = FALSE)$out
outliers <- boxplot(Quarterly_Tax,plot = FALSE)$out
print(outliers)
toyota[which(Quarterly_Tax %in% outliers),]
toyota <-toyota[-which(Quarterly_Tax %in% outliers),]
```

```
pairs(toyota)
cor(toyota)
library(corpcor)
cor2pcor(cor(toyota))
```

```
plot(Age_08_04,KM, col="dodgerblue4",pch=20)
plot(HP,cc, col="dodgerblue4",pch=20)
toyota_model1 <- lm(Price~
Age_08_04+KM+HP+Gears+cc+Doors+Quarterly_Tax+Weight)
summary(toyota_model1)
Confint(toyota_model1,level = 0.95)
predict(toyota_model1,interval = "predict")
```

```
layout(matrix(c(1,2,3,4),2,2))
plot(toyota_model1)
```

cc and Doors are influence to each other, predict the model based on individual records

```
model.carcc <- lm(Price ~ cc)
```

```

summary(model.carcc) # Its significant to output
model.cardoor <- lm(Price ~ Doors)
summary(model.cardoor)
model.car <- lm(Price ~ cc + Doors)
summary(model.car)
library(car)
influenceIndexPlot(toyota_model1,id.n=3)
influencePlot(toyota_model1,id.n=3)
toyota_model2 <-
lm(Price~Age_08_04+KM+HP+cc+Gears+Doors+Quarterly_Tax+Weight,data =
toyota[-c(81),])
summary(toyota_model2)
influencePlot(toyota_model2)
influenceIndexPlot(toyota_model2)
predict(toyota_model2)
vif(toyota_model1)
library(vcov)
avPlots(toyota_model2)
avPlots(toyota_model1)

toyota_model3 <-
lm(Price~Age_08_04+KM+HP+cc+Gears+Quarterly_Tax+Weight,data = toyota[-
c(81),])
summary(toyota_model3)
Confint(toyota_model3,level = 0.95)
predict(toyota_model3,interval = "predict")
plot(toyota_model3)

```

```

toyota_model4 <-
lm(Price~log(Age_08_04)+log(KM)+log(HP)+log(cc)+log(Gears)+log(Quarterly_
Tax)+log(Weight),data = toyota[-c(81),])

summary(toyota_model4)

Confint(toyota_model4,level = 0.95)

predict(toyota_model4,interval = "predict")

toyota_model_quad <-
lm(Price~Age_08_04+I(Age_08_04)+KM+I(KM)+HP+I(HP)+cc+I(cc)+Gears+I(
Gears)+Quarterly_Tax+I(Quarterly_Tax)+Weight+I(Weight),data = toyota[-
c(81),])

summary(toyota_model_quad)

Confint(toyota_model_quad,level = 0.95)

predict(toyota_model_quad,interval = "predict")

library("MASS")

stepAIC(toyota_model_quad)

```

Console:

```

> toyota <- read.csv(file.choose())
> View(toyota)

```

toyota.R x toyota x bank.R x Untitled1* x							
Filter							
	Id	Model	Price	Age_08_04	Mfg_Month	Mfg_Year	K
1	1	TOYOTA Corolla 2.0 D4D HATCHB TERRA 2/3-Doors	13500	23	10	2002	
2	2	TOYOTA Corolla 2.0 D4D HATCHB TERRA 2/3-Doors	13750	23	10	2002	
3	3	TOYOTA Corolla 2.0 D4D HATCHB TERRA 2/3-Doors	13950	24	9	2002	
4	4	TOYOTA Corolla 2.0 D4D HATCHB TERRA 2/3-Doors	14950	26	7	2002	
5	5	TOYOTA Corolla 2.0 D4D HATCHB SOL 2/3-Doors	13750	30	3	2002	
6	6	TOYOTA Corolla 2.0 D4D HATCHB SOL 2/3-Doors	12950	32	1	2002	
7	7	TOYOTA Corolla 2.0 D4D 90 3DR TERRA 2/3-Doors	16900	27	6	2002	
8	8	TOYOTA Corolla 2.0 D4D 90 3DR TERRA 2/3-Doors	18600	30	3	2002	
9	9	TOYOTA Corolla 1800 T SPORT VVT I 2/3-Doors	21500	27	6	2002	
10	10	TOYOTA Corolla 1.9 D HATCHB TERRA 2/3-Doors	12950	23	10	2002	
11	11	TOYOTA Corolla 1.8 VVTL-i T-Sport 3-Drs 2/3-Doors	20950	25	8	2002	

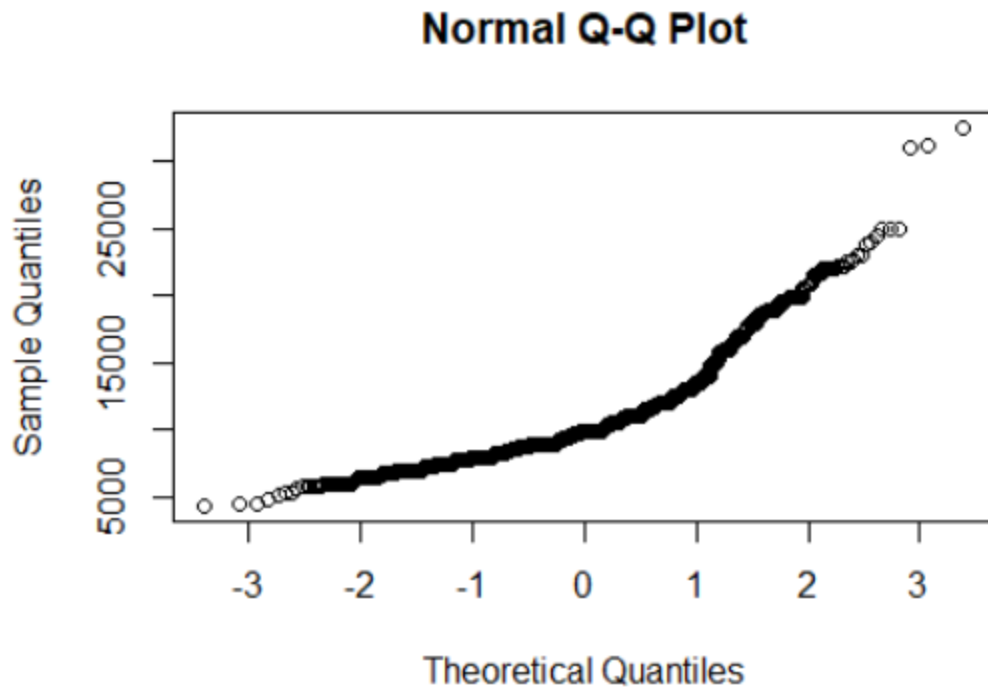
Showing 1 to 13 of 1,436 entries, 38 total columns

```
> toyota<-toyota[,c("Price","Age_08_04","KM","HP","cc","Doors","Gears","Quarterly_Tax","weight")]
> View(toyota)
```

	Price	Age_08_04	KM	HP	cc	Doors	Gears	Quarterly_Tax	Weight
1	13500	23	46986	90	2000	3	5	210	1165
2	13750	23	72937	90	2000	3	5	210	1165
3	13950	24	41711	90	2000	3	5	210	1165
4	14950	26	48000	90	2000	3	5	210	1165
5	13750	30	38500	90	2000	3	5	210	1170
6	12950	32	61000	90	2000	3	5	210	1170
7	16900	27	94612	90	2000	3	5	210	1245
8	18600	30	75889	90	2000	3	5	210	1245
9	21500	27	19700	192	1800	3	5	100	1185
10	12950	23	71138	69	1900	3	5	185	1105
11	20950	25	31461	192	1800	3	6	100	1185
12	19950	22	43610	192	1800	3	6	100	1185
13	19600	25	32189	192	1800	3	6	100	1185

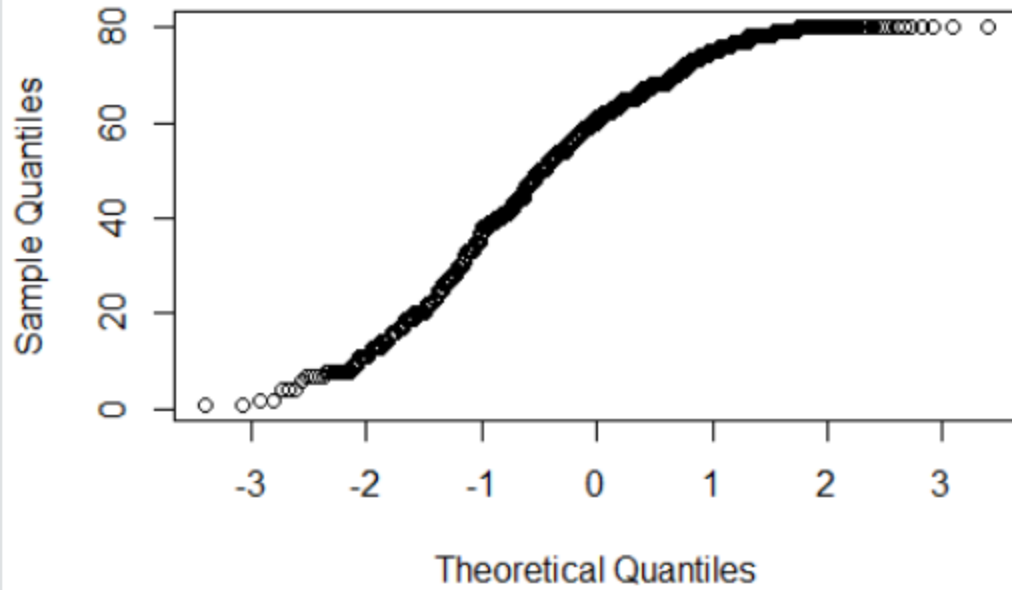
Showing 1 to 14 of 1,436 entries, 9 total columns

```
> attach(toyota)
> qqnorm(Price)
```



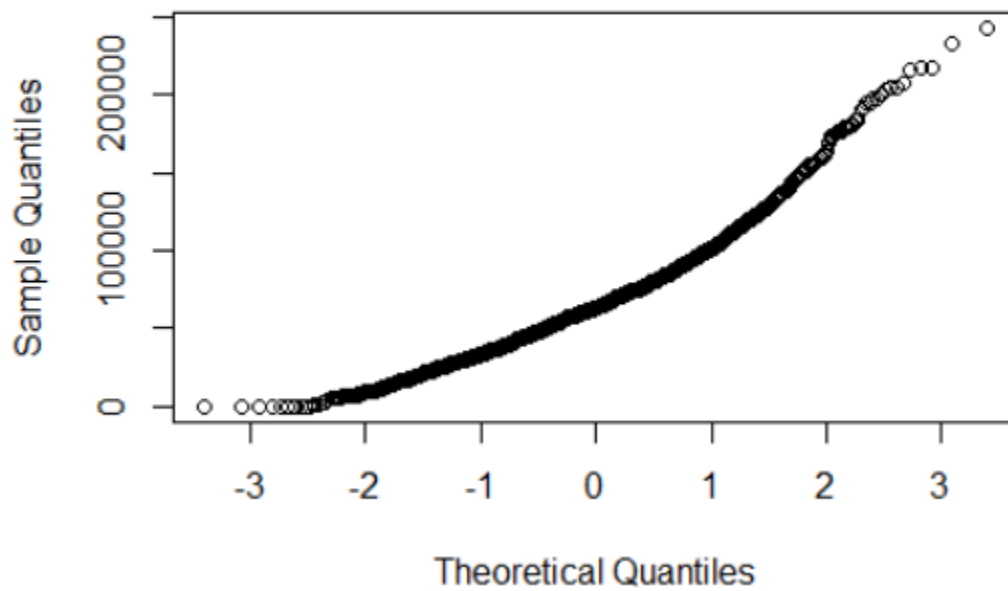
```
> qqnorm(Age_08_04)
```

Normal Q-Q Plot



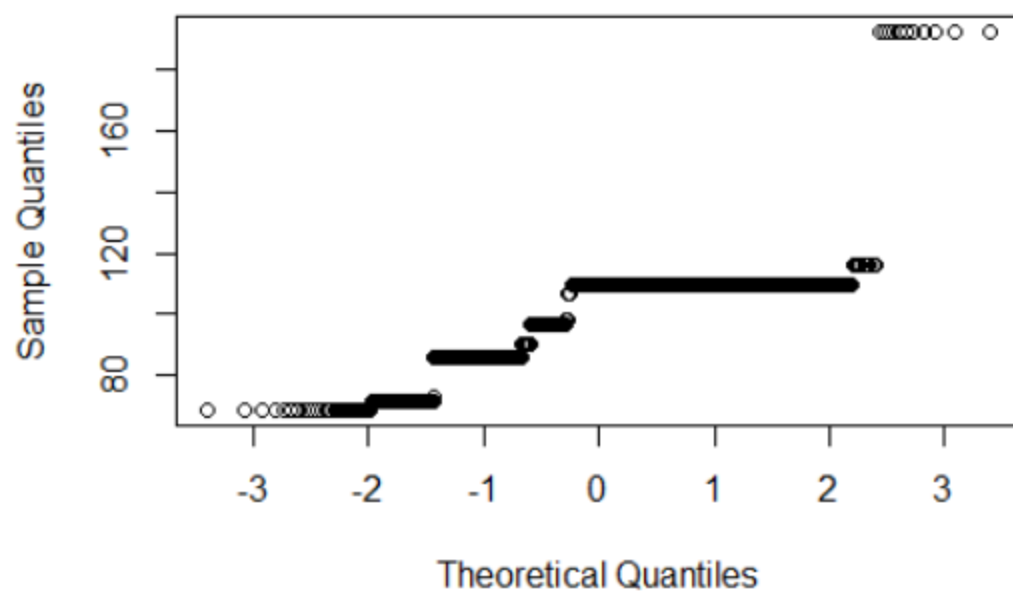
> qqnorm(KM)

Normal Q-Q Plot



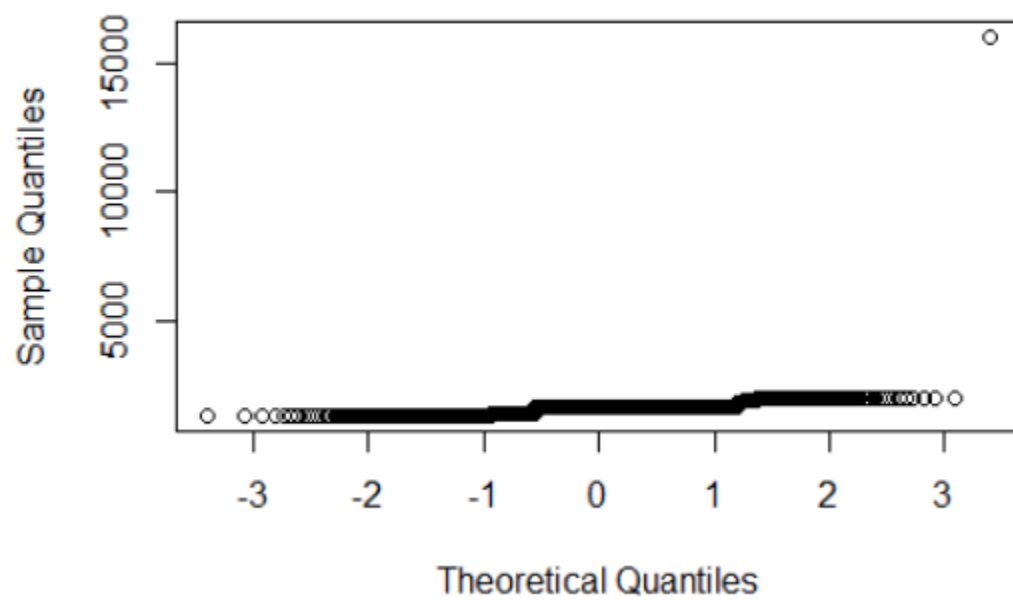
> qqnorm(HP)

Normal Q-Q Plot



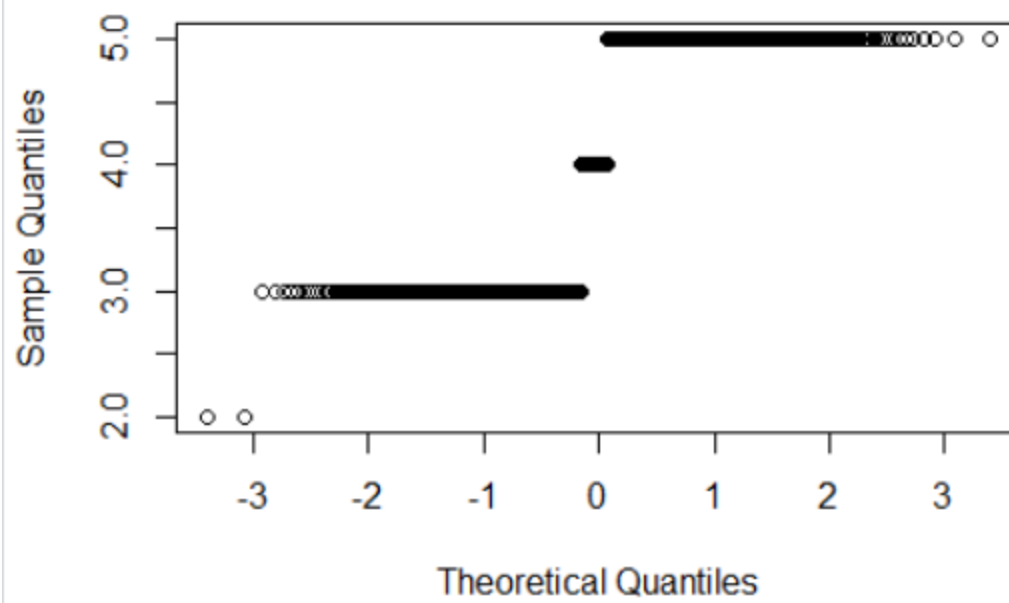
```
> qqnorm(cc)
```

Normal Q-Q Plot



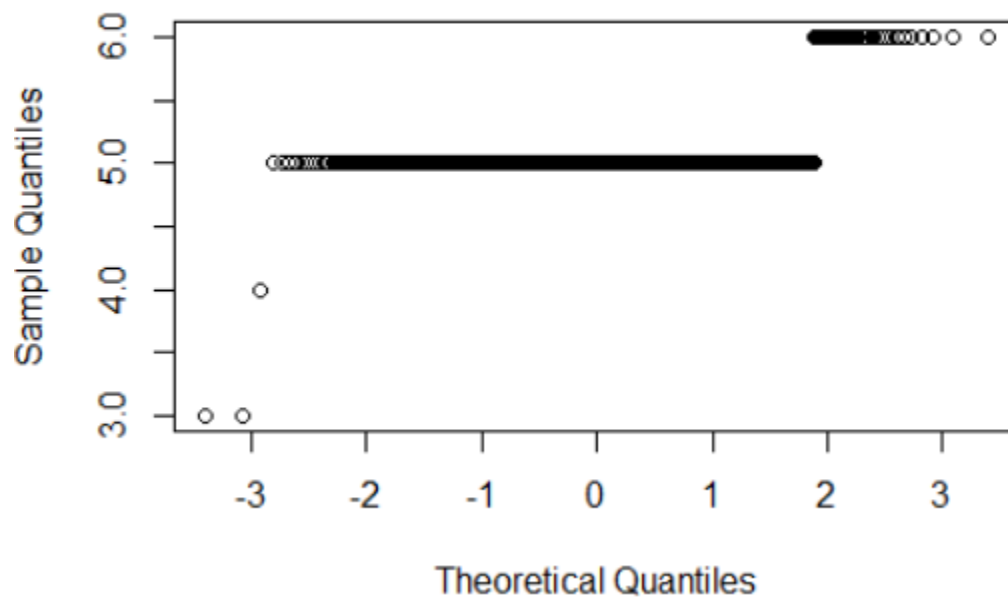
```
> qqnorm(Doors)
```

Normal Q-Q Plot



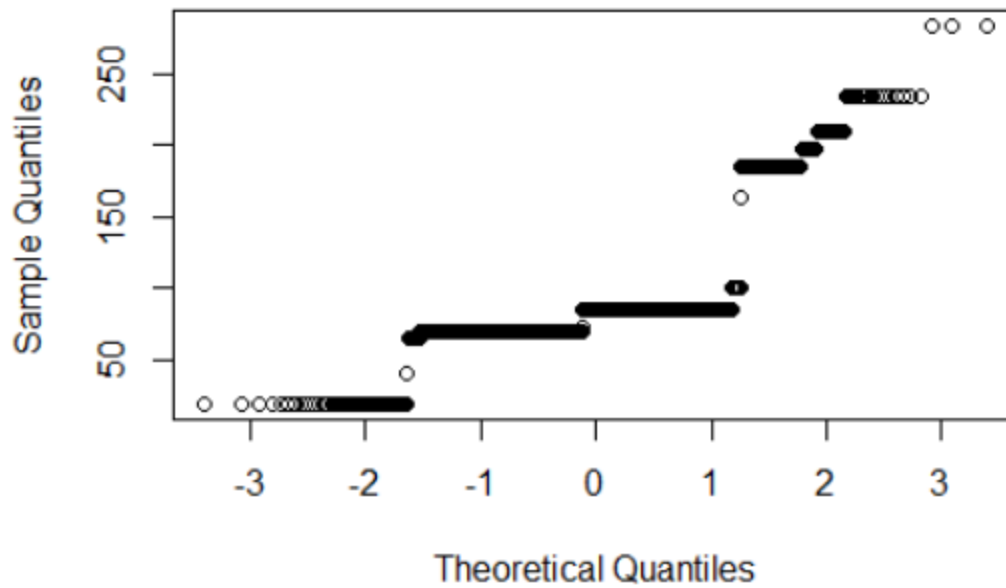
```
> qqnorm(Gears)
```

Normal Q-Q Plot



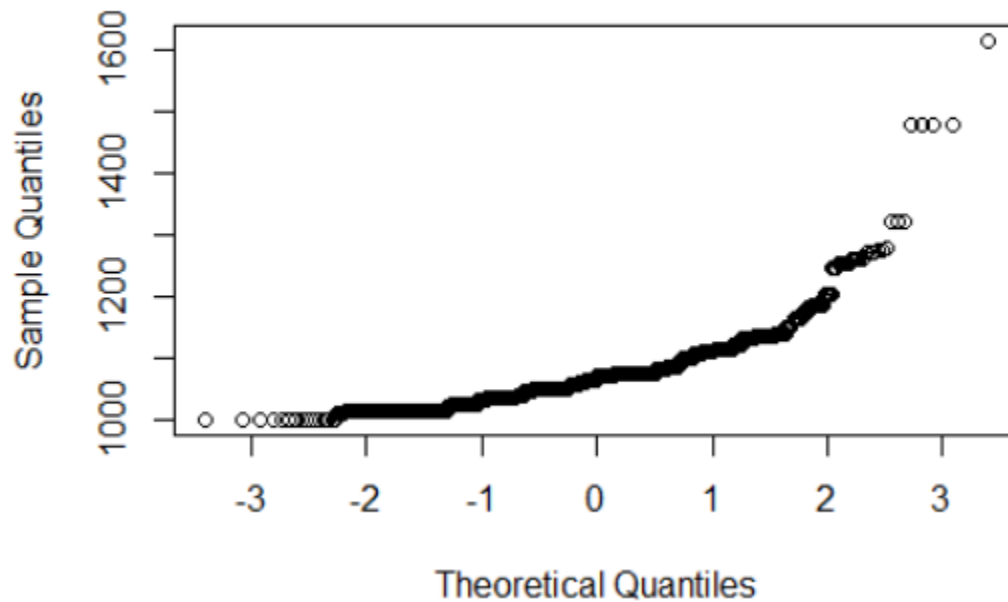
```
> qqnorm(Quarterly_Tax)
```

Normal Q-Q Plot



```
> qqnorm(weight)
```

Normal Q-Q Plot

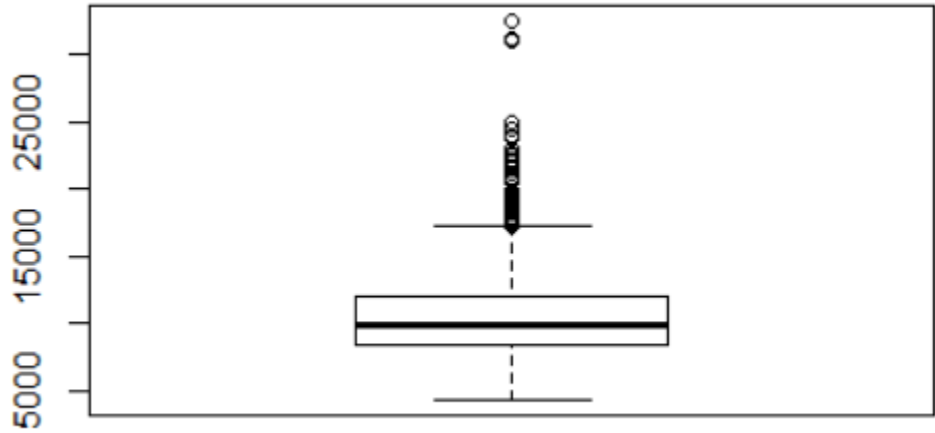


```
> summary(toyota)
```

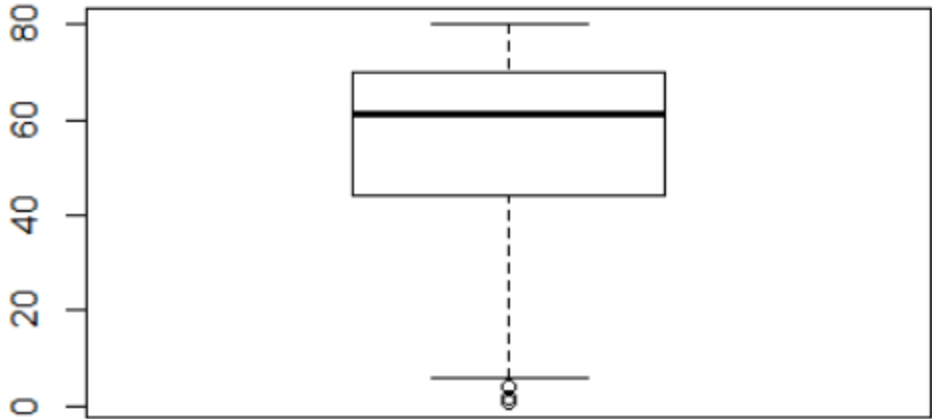
Price	Age_08_04	KM	HP	CC
Min. : 4350	Min. : 1.00	Min. : 1	Min. : 69.0	Min. : 13
1st Qu.: 8450	1st Qu.: 44.00	1st Qu.: 43000	1st Qu.: 90.0	1st Qu.: 14
Median : 9900	Median : 61.00	Median : 63390	Median : 110.0	Median : 16
Mean : 10731	Mean : 55.95	Mean : 68533	Mean : 101.5	Mean : 15
3rd Qu.: 11950	3rd Qu.: 70.00	3rd Qu.: 87021	3rd Qu.: 110.0	3rd Qu.: 16
Max. : 32500	Max. : 80.00	Max. : 243000	Max. : 192.0	Max. : 160

Doors	Gears	Quarterly_Tax	weight
Min. :2.000	Min. :3.000	Min. : 19.00	Min. :1000
1st Qu.:3.000	1st Qu.:5.000	1st Qu.: 69.00	1st Qu.:1040
Median :4.000	Median :5.000	Median : 85.00	Median :1070
Mean :4.033	Mean :5.026	Mean : 87.12	Mean :1072
3rd Qu.:5.000	3rd Qu.:5.000	3rd Qu.: 85.00	3rd Qu.:1085
Max. :5.000	Max. :6.000	Max. :283.00	Max. :1615

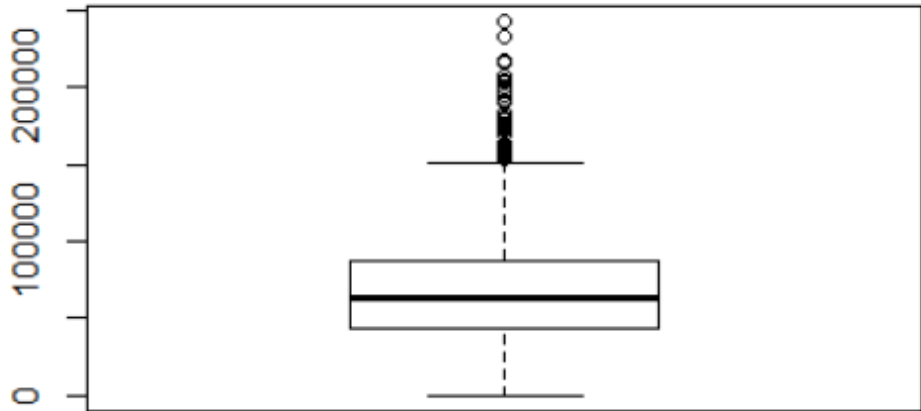
> boxplot(Price)



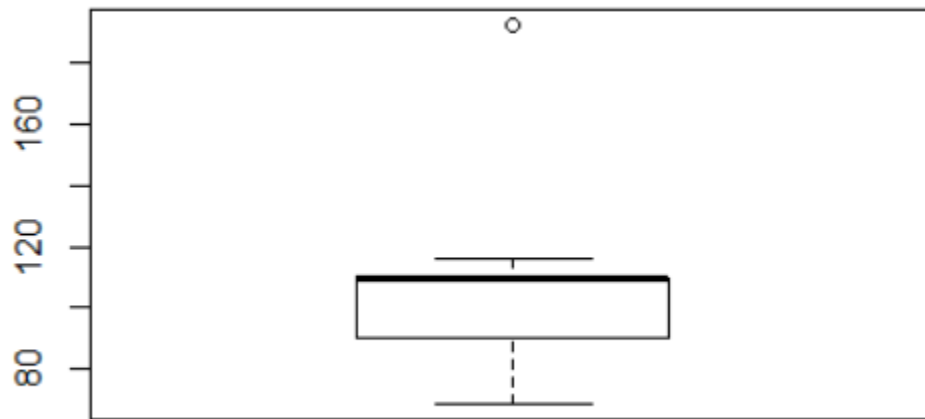
> boxplot(Age_08_04)



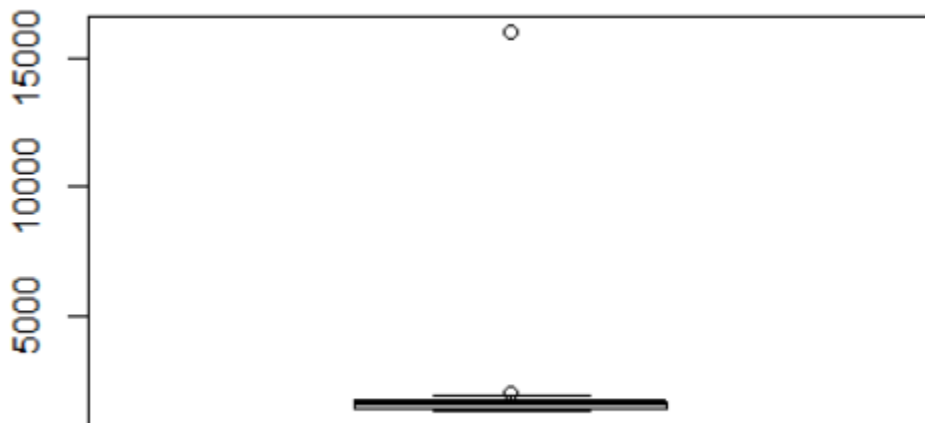
> boxplot(KM)



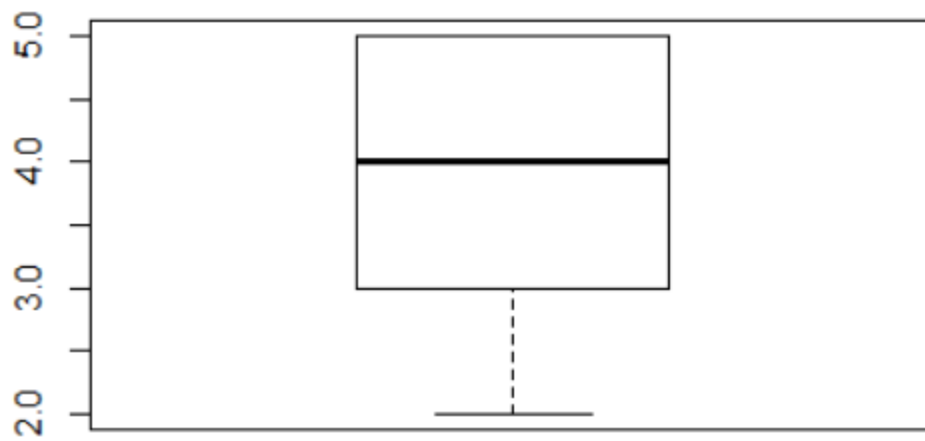
```
> boxplot(HP)
```



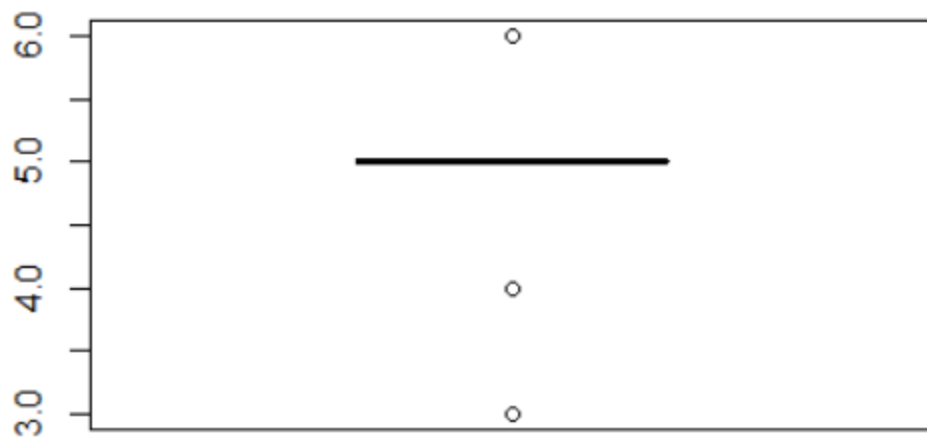
```
> boxplot(cc)
```



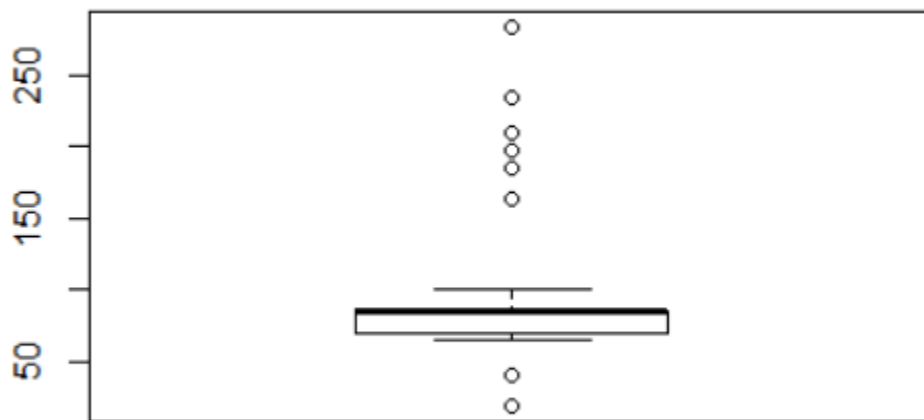
```
> boxplot(Doors)
```



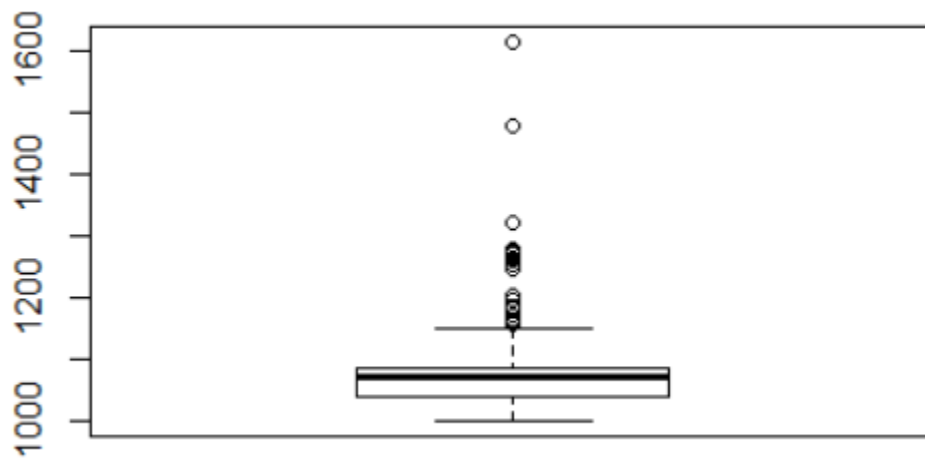
```
> boxplot(Gears)
```



```
> boxplot(Quarterly_Tax)
```

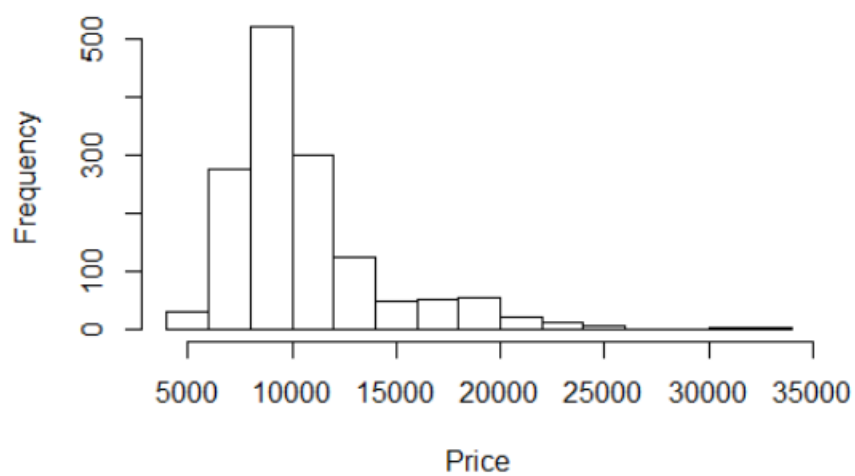


```
> boxplot(weight)
```



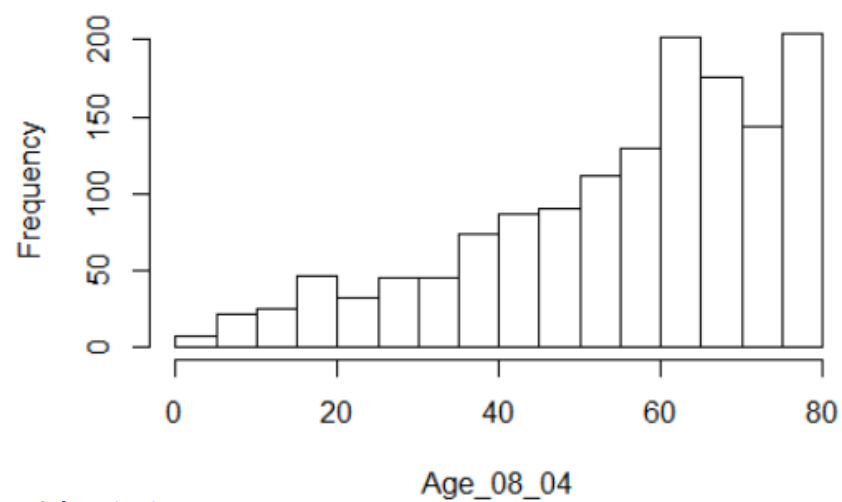
```
> hist(Price)
```

Histogram of Price



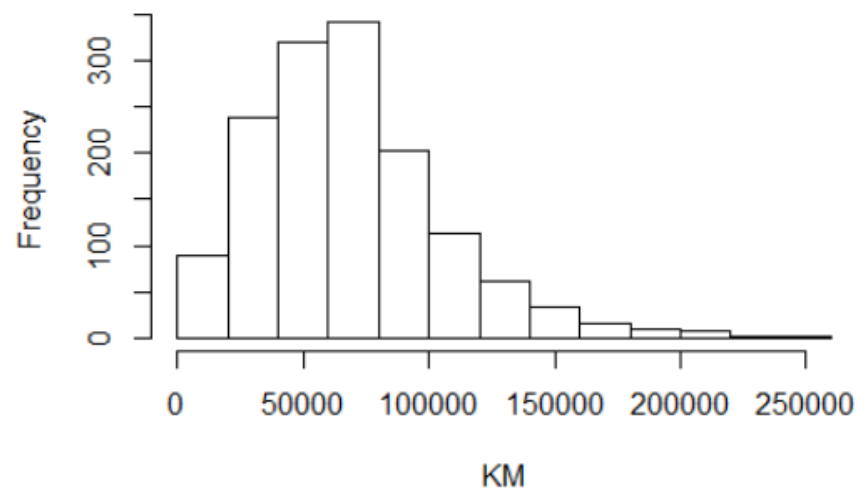
```
> hist(Age_08_04)
```

Histogram of Age_08_04

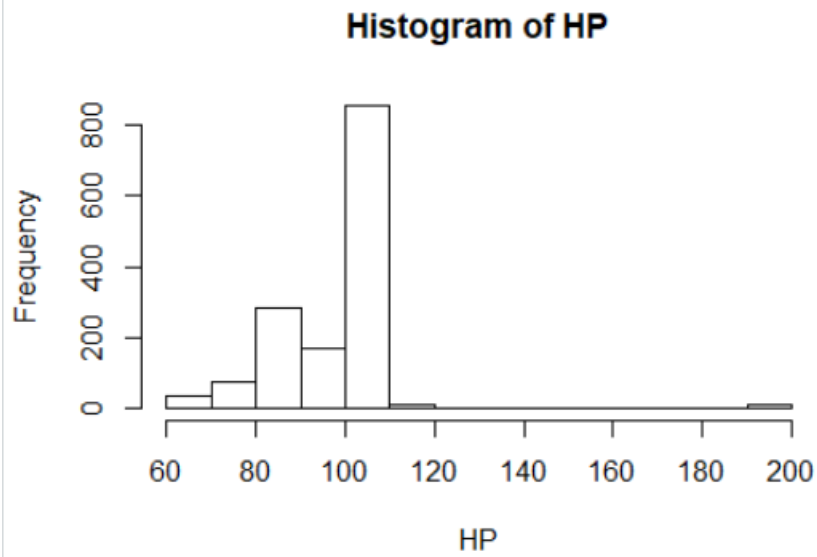


```
> hist(KM)
```

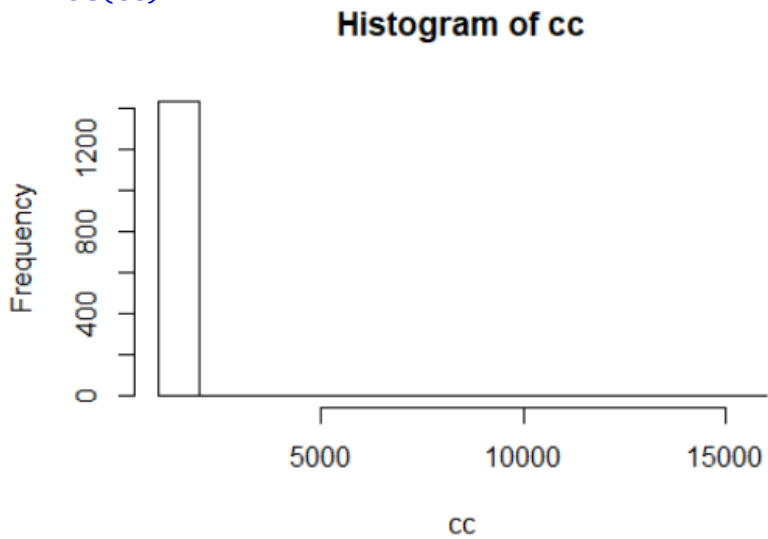
Histogram of KM



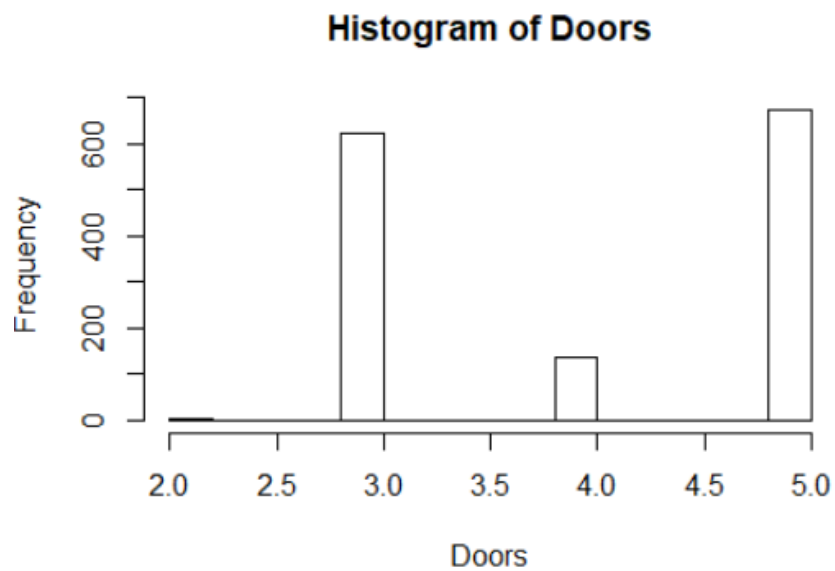
```
> hist(HP)
```



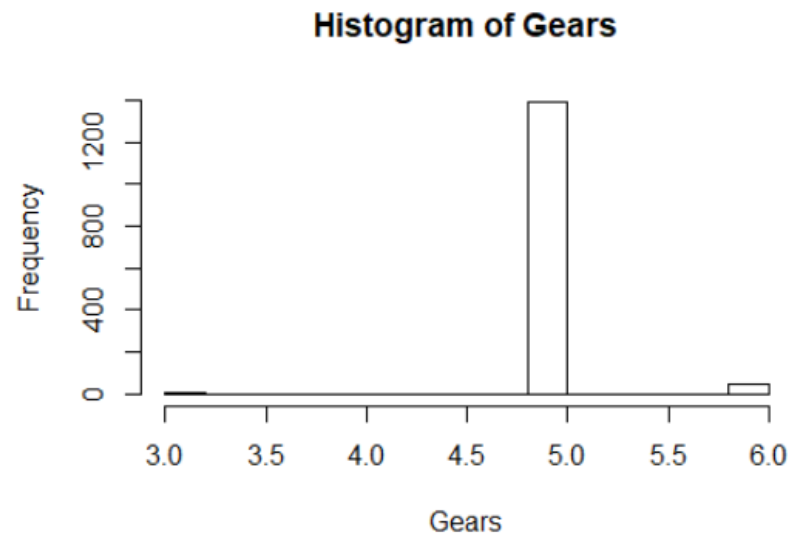
```
> hist(cc)
```



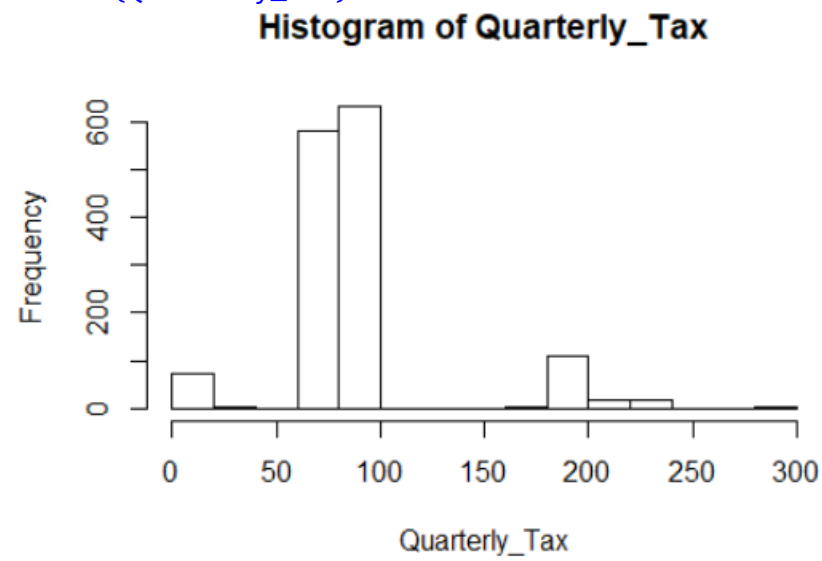
```
> hist(Doors)
```



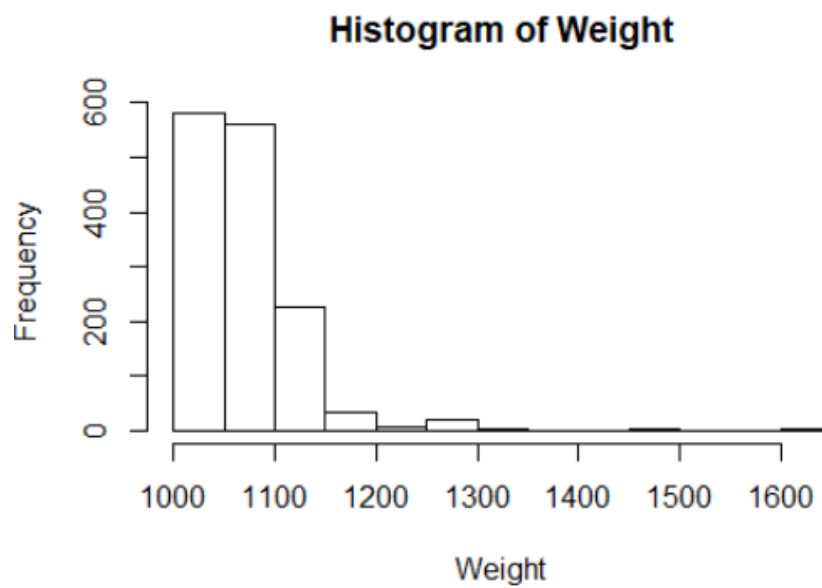

```
> hist(Gears)
```



```
> hist(Quarterly_Tax)
```



```
> hist(weight)
```



```

> library(e1071)
> skewness(Price)
[1] 1.700327
> skewness(Age_08_04)
[1] -0.8249756
> skewness(KM)
[1] 1.013791
> skewness(HP)
[1] 0.9538397
> skewness(cc)
[1] 27.37451
> skewness(Doors)
[1] -0.07623547
> skewness(Gears)
[1] 2.27919
> skewness(Quarterly_Tax)
[1] 1.98967
> skewness(weight)
[1] 3.102148
> skewness(Weight)
[1] 3.102148
> boxplot(Price)$out
[1] 18600 21500 20950 19950 19600 21500 22500 22000 22750 17950 17495 17950 19000
[14] 17950 17950 21950 17950 20500 21950 18950 18750 17950 17950 18950 22250 18950
[27] 19950 18750 18450 18950 17250 17950 17450 17950 21950 22250 19950 18900 19950
[40] 18750 17450 18990 18500 18500 19450 18800 17450 17950 32500 31000 31275 24950
[53] 24950 22950 24990 21950 17900 19250 22250 18950 19950 18950 21750 17950 18450
[66] 23000 19900 23950 19950 18500 18950 20500 24500 19450 20950 19950 18450 19500
[79] 21750 19500 18900 19750 19750 18950 20750 19600 19500 17650 19950 19950 20950
[92] 20500 17795 18245 23750 19500 18950 21950 19950 18950 19950 21950 22500 18500
[105] 18700 21125 21500 17795 18245 18950
> boxplot(Price,plot = FALSE)$out
[1] 18600 21500 20950 19950 19600 21500 22500 22000 22750 17950 17495 17950 19000
[14] 17950 17950 21950 17950 20500 21950 18950 18750 17950 17950 18950 22250 18950
[27] 19950 18750 18450 18950 17250 17950 17450 17950 21950 22250 19950 18900 19950
[40] 18750 17450 18990 18500 18500 19450 18800 17450 17950 32500 31000 31275 24950
[53] 24950 22950 24990 21950 17900 19250 22250 18950 19950 18950 21750 17950 18450
[66] 23000 19900 23950 19950 18500 18950 20500 24500 19450 20950 19950 18450 19500
[79] 21750 19500 18900 19750 19750 18950 20750 19600 19500 17650 19950 19950 20950
[92] 20500 17795 18245 23750 19500 18950 21950 19950 18950 19950 21950 22500 18500
[105] 18700 21125 21500 17795 18245 18950
> outliers <- boxplot(Price,plot = FALSE)$out
> print(outliers)
[1] 18600 21500 20950 19950 19600 21500 22500 22000 22750 17950 17495 17950 19000
[14] 17950 17950 21950 17950 20500 21950 18950 18750 17950 17950 18950 22250 18950
[27] 19950 18750 18450 18950 17250 17950 17450 17950 21950 22250 19950 18900 19950
[40] 18750 17450 18990 18500 18500 19450 18800 17450 17950 32500 31000 31275 24950
[53] 24950 22950 24990 21950 17900 19250 22250 18950 19950 18950 21750 17950 18450
[66] 23000 19900 23950 19950 18500 18950 20500 24500 19450 20950 19950 18450 19500
[79] 21750 19500 18900 19750 19750 18950 20750 19600 19500 17650 19950 19950 20950
[92] 20500 17795 18245 23750 19500 18950 21950 19950 18950 19950 21950 22500 18500
[105] 18700 21125 21500 17795 18245 18950
> toyota[which(toyota$Price %in% outliers),]
  Price Age_08_04   KM   HP   cc Doors Gears Quarterly_Tax Weight
8  18600         30 75889   90  2000     3     5          210   1245
9  21500         27 19700  192  1800     3     5          100   1185
11 20950         25 31461  192  1800     3     6          100   1185
12 19950         22 43610  192  1800     3     6          100   1185
13 19600         25 32189  192  1800     3     6          100   1185
14 21500         31 23000  192  1800     3     6          100   1185
15 22500         32 34131  192  1800     3     6          100   1185
16 22000         28 18739  192  1800     3     6          100   1185
17 22750         30 34000  192  1800     3     5          100   1185
18 17950         24 21716  110  1600     3     5           85   1105
27 17495         27 34545  110  1600     3     5           85   1120
30 17950         30 11090  110  1600     3     5           85   1120
46 19000         23 84000   90  2000     5     5          234   1270

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47	17950	27	79375	90	2000	5	5	234	1255
49	17950	22	72215	90	2000	5	5	234	1255
50	21950	31	64982	192	1800	5	6	100	1195
51	17950	22	62636	90	2000	5	5	234	1255
53	20500	26	56000	110	1600	5	5	100	1180
54	21950	27	49866	192	1800	5	5	100	1195
59	18950	23	39704	110	1600	5	5	100	1180
63	18750	31	36544	110	1600	5	5	85	1130
64	17950	30	33511	110	1600	5	5	85	1130
65	17950	27	32809	97	1400	5	5	85	1110
67	18950	28	30993	110	1600	5	5	85	1130
69	22250	22	30000	110	2000	5	5	234	1275
73	18950	28	28817	110	1598	5	5	85	1130
75	19950	28	28000	110	1600	5	5	85	1130
77	18750	31	25266	110	1600	5	5	85	1130
78	18450	27	23489	110	1600	5	5	85	1115
81	18950	25	20019	110	16000	5	5	100	1180
82	17250	29	20000	110	1600	5	5	85	1115
84	17950	31	16238	110	1600	5	5	100	1180
86	17450	28	8537	110	1600	5	5	85	1130
88	17950	20	66966	90	2000	3	5	210	1245
90	21950	19	50005	110	2000	3	5	234	1265
92	22250	20	37500	90	2000	3	5	234	1260
93	19950	16	34472	90	1995	3	5	234	1260
95	18900	20	31850	110	1600	3	5	85	1120
96	19950	17	30351	90	1995	3	5	234	1260
99	18750	11	24500	110	1600	3	5	85	1120
100	17450	18	23902	97	1400	3	5	85	1100
101	18990	20	23175	110	1600	3	5	85	1120
103	18500	13	18000	71	1400	3	5	85	1125
104	18500	11	16123	110	1600	3	5	85	1105
105	19450	11	14635	110	1600	3	5	100	1155
107	18800	14	11500	110	1600	3	5	69	1045
108	17450	17	10000	97	1400	3	5	85	1100
109	17950	20	7187	110	1600	3	5	85	1105
110	32500	4	1	116	2000	5	5	283	1480
111	31000	4	4000	116	2000	5	5	283	1480
112	31275	4	1500	116	2000	5	5	283	1480
113	24950	8	13253	116	2000	5	5	234	1320
114	24950	8	13253	116	2000	5	5	234	1320
115	22950	7	10000	116	2000	5	5	234	1270
116	24990	8	6000	90	2000	5	5	234	1280
117	21950	8	10841	90	2000	5	5	234	1270
118	17900	7	1	110	1600	3	5	85	1105
119	19250	20	63000	90	2000	5	5	234	1255
120	22250	17	57313	110	2000	5	5	234	1275
121	18950	13	57037	110	1600	5	5	85	1115
122	19950	19	51099	90	2000	5	5	234	1255
124	18950	20	39115	110	1600	5	5	85	1130
126	21750	16	36000	110	1600	5	5	85	1130
129	17950	17	33740	97	1400	5	5	85	1135
137	18450	19	27371	97	1400	5	5	85	1135
139	23000	11	25000	116	2000	5	5	64	1320
140	19900	20	23000	110	1600	5	5	85	1130
142	23950	19	21684	192	1800	5	5	19	1185
143	19950	13	21428	110	1600	5	5	85	1130
144	18500	16	20629	110	1600	4	5	85	1090
145	18950	15	20270	110	1600	5	5	85	1130
147	20500	20	20000	110	1600	5	5	100	1165
148	24500	13	19988	110	1600	5	5	85	1130
149	19450	19	18328	110	1600	5	5	85	1130
150	20950	14	17896	110	1600	4	5	85	1150
152	19950	19	17038	110	1600	5	5	85	1130
153	18450	10	13747	97	1400	5	5	85	1110
154	19500	12	13634	110	1600	5	5	85	1115
155	21750	13	13178	110	1600	5	5	85	1130
157	19500	16	13000	110	1600	4	5	85	1105

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158 18900      11 12500 110 1600      5      5      85 1115
159 19750      17 11999 110 1600      5      5      85 1130
160 19750      16 11754 110 1600      5      5     100 1180
161 18950      16 11000 110 1600      4      5      85 1105
162 20750      17 10000 110 1598      5      5      85 1105
163 19600       9  7650 110 1600      5      5      85 1115
164 19500      14  6500 110 1600      4      5      85 1100
165 17650      11  6155  97 1400      5      5      85 1110
166 19950      14  6000 110 1600      5      5      85 1130
167 19950      14  5459 110 1600      5      5      85 1130
168 20950      14  5278 110 1600      4      5      85 1150
169 20500      12  5000 110 1600      5      5      85 1130
170 17795       9    1  98 1400      4      5      19 1065
171 18245       9    1 110 1600      5      5      19 1075
172 23750       8 11000 110 1600      5      5      85 1130
173 19500       8 10077  97 1400      5      5      85 1110
174 18950       8 10000  97 1400      5      5      85 1110
175 21950       8  9788 110 1600      5      5      85 1130
176 19950       8  8574 110 1600      5      5      85 1130
177 18950       8  7000 110 1600      5      5      85 1115
178 19950       7  6250 110 1600      5      5      85 1115
179 21950       8  5000 110 1600      5      5      85 1130
180 22500       6  3000 110 1600      5      5      85 1130
181 18500       7  2000 110 1600      5      5      19 1075
182 18700       7   450  97 1400      5      5      85 1110
183 21125       2   225  97 1400      5      5      85 1110
184 21500       2    15 110 1600      5      5      85 1130
185 17795       1    1  98 1400      4      5      19 1100
186 18245       1    1 110 1600      5      5      19 1075
524 18950      49 49568 110 1600      3      5      19 1105
> toyota <-toyota[-which(Price %in% outliers),]
> boxplot(KM)$out
 [1] 243000 180638 179860 178858 161000 158320 216000 198167 176000 174139 174000
[12] 205000 204250 194545 190900 183500 176184 174833 155720 155500 154783 154462
[23] 232940 218118 217764 207114 203254 200732 197501 194765 191620 183277 180378
[34] 178800 176177 176000 172980 170000 164000 161775 160000 159968 159908 158492
[45] 156204 156169 155210 155000 154900
> boxplot(KM,plot = FALSE)$out
 [1] 243000 180638 179860 178858 161000 158320 216000 198167 176000 174139 174000
[12] 205000 204250 194545 190900 183500 176184 174833 155720 155500 154783 154462
[23] 232940 218118 217764 207114 203254 200732 197501 194765 191620 183277 180378
[34] 178800 176177 176000 172980 170000 164000 161775 160000 159968 159908 158492
[45] 156204 156169 155210 155000 154900
> outlier1 <- boxplot(KM,plot = FALSE)$out
> print(outlier1)
 [1] 243000 180638 179860 178858 161000 158320 216000 198167 176000 174139 174000
[12] 205000 204250 194545 190900 183500 176184 174833 155720 155500 154783 154462
[23] 232940 218118 217764 207114 203254 200732 197501 194765 191620 183277 180378
[34] 178800 176177 176000 172980 170000 164000 161775 160000 159968 159908 158492
[45] 156204 156169 155210 155000 154900
> toyota[which(KM %in% outliers),]
      Price Age_08_04      KM  HP    cc Doors Gears Quarterly_Tax weight
24   16950         28  32220 110 1600     3     5         85    1120
189  11950         40 179860  90 2000     5     5        210    1205
208  10950         43  85017  97 1400     5     5         85    1060
249  13500         43  55539 110 1600     5     5         85    1085
446  10950         50  74849 110 1600     4     5         85    1060
478   9930         53  63635 110 1600     4     5         69    1035
480  11950         54  63123 110 1600     4     5         69    1035
693   9950         61  97425 110 1600     5     5         85    1075
705   8450         65  93408  86 1300     3     5         69    1015
713   8750         65  91246  86 1300     3     5         69    1015
1139 8750         76 104344 110 1600     3     5         69    1050
NA      NA         NA      NA  NA    NA     NA     NA         NA     NA
NA.1    NA         NA      NA  NA    NA     NA     NA         NA     NA
> toyota <-toyota[-which(KM %in% outliers),]
>

```

```

> boxplot(cc)$out
 [1] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[14] 2000 2000 16000 2000 2000 2000 2000 1995 1995 2000 2000 2000 2000
[27] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[40] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[53] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[66] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[79] 2000 2000 2000 2000 2000 2000 1975 2000 2000 2000 2000 2000 2000
[92] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[105] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[118] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
> boxplot(cc,plot = FALSE)$out
 [1] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[14] 2000 2000 16000 2000 2000 2000 2000 1995 1995 2000 2000 2000 2000
[27] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[40] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[53] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[66] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[79] 2000 2000 2000 2000 2000 2000 1975 2000 2000 2000 2000 2000 2000
[92] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[105] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[118] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
> outliers <- boxplot(cc,plot = FALSE)$out
> print(outliers)
 [1] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[14] 2000 2000 16000 2000 2000 2000 2000 1995 1995 2000 2000 2000 2000
[27] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[40] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[53] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[66] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[79] 2000 2000 2000 2000 2000 2000 1975 2000 2000 2000 2000 2000 2000
[92] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[105] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
[118] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000
> toyota[which(cc %in% outliers),]
  Price Age_08_04   KM   HP   cc Doors Gears Quarterly_Tax weight
1  13500         23  46986  90 2000     3     5           210   1165
2  13750         23  72937  90 2000     3     5           210   1165
3  13950         24  41711  90 2000     3     5           210   1165
4  14950         26  48000  90 2000     3     5           210   1165
5  13750         30  38500  90 2000     3     5           210   1170
6  12950         32  61000  90 2000     3     5           210   1170
7  16900         27  94612  90 2000     3     5           210   1245
10 12950         23  71138  69 1900     3     5           185   1105
70 15950         25  29719  97 1400     5     5            85   1110
71 15950         28  29206  97 1400     5     5            85   1110
72 12995         32  29198  97 1400     5     5            85   1060
74 15750         23  28227  97 1400     5     5            85   1110
79 16895         29  22575 110 1600     5     5            85   1115
83 15450         25  17003  97 1400     5     5            85   1110
134 15950         13  29371 110 1600     4     5            19   1105
192  4350         44 158320  69 1800     5     5            64   1110
199  9950         42 105699  97 1400     3     5            69   1025
201 11495         44  96829 110 1600     5     5            85   1075
203 10500         42  92204 110 1600     5     5            85   1075
204 10450         35  91456  69 1900     3     5           185   1110
207 12500         40  85389 110 1600     5     5            85   1075
222 12450         44  74172 110 1600     5     5           163   1615
223 11950         40  73042 110 1598     5     5            85   1075
224 14950         44  71793 110 1600     4     5           197   1067
225 12450         35  71200 110 1600     5     5            85   1075
226 12950         38  67805 110 1600     5     5            85   1075
227 11950         35  65988 110 1600     3     5            69   1040
228 11690         34  65345  97 1400     5     5            85   1060
229 12450         42  64564 110 1600     5     5            85   1080
231 11925         44  63451  97 1400     3     5            69   1025
232 12950         33  62000 110 1600     5     5            19   1075

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234	12900	41	61200	110	1600	3	5	69	1045
252	10850	43	54600	110	1600	4	5	69	1030
301	12750	37	39757	110	1600	5	5	85	1075
302	12500	41	39659	110	1600	3	5	69	1045
311	12950	40	38653	110	1600	5	5	85	1080
325	12950	39	34599	110	1600	5	5	85	1075
328	12950	33	33591	110	1600	5	5	85	1075
357	12695	39	24723	110	1600	4	5	85	1060
382	7750	54	174139	72	2000	4	5	185	1100
498	10950	55	58377	110	1600	3	5	69	1050
501	9700	51	57645	110	1600	5	5	85	1080
507	11950	53	55500	110	1600	4	5	69	1035
514	10950	49	53116	97	1400	3	5	69	1025
519	10495	48	50967	97	1400	5	5	85	1060
534	11895	52	47689	110	1600	5	5	85	1075
536	11950	50	47219	110	1600	5	5	85	1080
583	8950	56	31000	97	1400	3	5	69	1025
605	7900	68	204250	72	2000	3	5	185	1115
722	7900	62	88667	110	1600	4	5	69	1040
724	7950	61	88127	86	1300	3	5	69	1015
725	6900	62	88000	86	1300	3	5	69	1020
727	10995	59	87654	86	1300	5	5	85	1065
728	8900	59	86888	110	1600	3	5	69	1050
729	9500	59	86871	86	1300	5	5	69	1040
730	8950	68	86714	110	1600	4	5	69	1035
733	10500	60	85000	86	1300	3	5	69	1025
734	9250	68	84976	110	1600	4	5	69	1035
736	10450	62	84549	110	1600	5	5	85	1075
737	9250	68	84482	110	1600	5	5	85	1075
738	8750	62	83908	110	1600	5	5	85	1070
740	9800	68	83000	107	1600	5	5	85	1100
742	10450	62	82421	110	1600	3	6	85	1065
746	8450	68	81965	86	1300	5	5	69	1035
747	8250	66	81250	110	1600	3	5	19	1050
748	10950	65	81192	110	1600	3	6	85	1065
749	8950	61	81170	110	1600	4	5	69	1040
751	10450	61	80714	110	1600	5	5	85	1075
752	10950	57	80470	110	1600	5	5	85	1085
753	8450	65	80439	110	1600	4	5	69	1035
755	9950	68	80426	110	1600	3	5	85	1055
756	8750	62	80265	86	1300	3	5	69	1015
757	9950	65	80153	110	1600	5	5	85	1070
760	10950	62	80000	110	1600	5	5	85	1075
765	10950	59	79660	86	1300	5	5	85	1065
768	9500	57	78955	86	1300	5	5	69	1045
775	9750	68	77695	110	1600	4	5	69	1035
781	9950	61	76700	86	1300	5	5	69	1035
800	8250	65	74179	110	1600	3	5	69	1050
803	9250	64	73500	110	1600	3	5	69	1050
817	8000	58	70560	110	1600	3	5	69	1050
828	9650	67	69000	110	1600	3	6	85	1065
831	8950	63	68453	110	1600	5	5	85	1070
889	11250	61	61144	110	1600	5	5	85	1090
906	9950	65	59000	110	1600	3	5	69	1050
940	10250	60	54554	110	1600	3	6	85	1065
987	8250	63	44944	110	1600	4	5	69	1035
1166	8900	73	97085	110	1600	5	5	85	1085
1167	7950	69	97000	110	1600	4	5	69	1035
1168	6495	74	96302	86	1300	3	5	69	1015
1170	9250	74	96000	110	1600	5	5	85	1085
1171	6650	78	95909	110	1600	5	5	85	1070
1172	6990	79	95700	110	1600	5	5	85	1085
1173	7750	78	95651	110	1600	5	5	85	1070
1174	6950	79	95000	86	1300	5	5	69	1035
1175	7250	80	94447	110	1600	3	5	69	1050
1176	9950	80	94079	110	1600	5	5	85	1085
1177	9250	80	93841	110	1600	5	5	85	1070

[illegible]

```

> boxplot(Quarterly_Tax)$out
[1] 210 210 210 210 210 210 210 210 185 19 19 234 234 234 234 234 234 19 234
[20] 210 234 234 234 234 283 283 283 234 234 234 234 234 234 234 234 19 19 19
[39] 19 19 19 19 19 19 19 185 210 210 197 185 185 185 185 210 197 185 185
[58] 197 185 210 210 185 163 197 19 210 19 210 185 185 19 197 19 19 19 19
[77] 19 185 185 185 185 185 185 185 185 197 185 185 185 210 185 185 185 185 185
[96] 19 19 197 185 185 185 185 185 19 185 185 19 19 19 19 19 19 185 185 185
[115] 185 185 185 185 185 185 185 185 185 197 197 185 185 185 185 185 185 185 185
[134] 185 185 185 185 197 197 19 19 19 19 185 185 185 185 185 19 19 19 19
[153] 210 185 19 185 19 185 19 19 19 19 19 19 19 40 185 185 197 185 185
[172] 185 185 185 185 185 185 19 185 185 185 185 185 197 185 185 185 185 185
[191] 19 185 185 185 185 185 197 19 19 19 19 19 185 185 19 185 19 19 19
[210] 19 19 19 19 19 185 185 19 19 19 19 19 19 19 19 19 19 19

> boxplot(Quarterly_Tax,plot = FALSE)$out
[1] 210 210 210 210 210 210 210 210 185 19 19 234 234 234 234 234 234 19 234
[20] 210 234 234 234 234 283 283 283 234 234 234 234 234 234 234 234 19 19 19
[39] 19 19 19 19 19 19 19 185 210 210 197 185 185 185 185 210 197 185 185
[58] 197 185 210 210 185 163 197 19 210 19 210 185 185 19 197 19 19 19 19
[77] 19 185 185 185 185 185 185 185 185 197 185 185 185 210 185 185 185 185 185
[96] 19 19 197 185 185 185 185 185 19 185 185 19 19 19 19 19 19 185 185 185
[115] 185 185 185 185 185 185 185 185 185 197 197 185 185 185 185 185 185 185 185
[134] 185 185 185 185 197 197 19 19 19 19 185 185 185 185 185 19 19 19 19
[153] 210 185 19 185 19 185 19 19 19 19 19 19 19 40 185 185 197 185 185
[172] 185 185 185 185 185 185 19 185 185 185 185 185 197 185 185 185 185 185
[191] 19 185 185 185 185 185 197 19 19 19 19 19 185 185 19 185 19 19 19
[210] 19 19 19 19 19 185 185 19 19 19 19 19 19 19 19 19 19 19

> outliers <- boxplot(Quarterly_Tax,plot = FALSE)$out
> print(outliers)
[1] 210 210 210 210 210 210 210 210 185 19 19 234 234 234 234 234 234 19 234
[20] 210 234 234 234 234 283 283 283 234 234 234 234 234 234 234 234 19 19 19
[39] 19 19 19 19 19 19 19 185 210 210 197 185 185 185 185 210 197 185 185
[58] 197 185 210 210 185 163 197 19 210 19 210 185 185 19 197 19 19 19 19
[77] 19 185 185 185 185 185 185 185 185 197 185 185 185 210 185 185 185 185 185
[96] 19 19 197 185 185 185 185 185 19 185 185 19 19 19 19 19 19 185 185 185
[115] 185 185 185 185 185 185 185 185 185 197 197 185 185 185 185 185 185 185 185
[134] 185 185 185 185 197 197 19 19 19 19 185 185 185 185 185 19 19 19 19
[153] 210 185 19 185 19 185 19 19 19 19 19 19 19 40 185 185 197 185 185
[172] 185 185 185 185 185 185 19 185 185 185 185 185 197 185 185 185 185 185
[191] 19 185 185 185 185 185 197 19 19 19 19 19 185 185 19 185 19 19 19
[210] 19 19 19 19 19 185 185 19 19 19 19 19 19 19 19 19 19 19

> toyota[which(Quarterly_Tax %in% outliers),]
  Price Age_08_04   KM   HP   cc Doors Gears Quarterly_Tax Weight
10  12950        23  71138   69 1900      3     5         185   1105
19  16750        24  25563  110 1600      3     5          19   1065
20  16950        30  64359  110 1600      3     5          85   1105
21  15950        30  67660  110 1600      3     5          85   1105
22  16950        29  43905  110 1600      3     5        100   1170
23  15950        28  56349  110 1600      3     5          85   1120
25  16250        29  25813  110 1600      3     5          85   1120
26  15950        25  28450  110 1600      3     5          85   1120
29  16950        28  44142  110 1600      3     5          85   1120
39  15750        32  25329   97 1400      3     5          85   1100
61  14950        22  37400   97 1400      5     5          85   1110
87  14900        30   7000   97 1400      5     5          85   1100
89  15950        19  51884   97 1400      3     5          85   1100
91  16450        20  48110   97 1400      3     5          85   1100
94  15950        20  33329   97 1400      3     5          85   1100
98  15950        19  25948   97 1400      3     5          85   1100
106 16950        19  13748   97 1400      3     5          85   1100
151 17200        20  17300   97 1400      5     5          85   1110
190  7750        43 178858  110 1600      3     5        197   1084
211 13250        41  81106   69 1900      5     5        185   1140
214 11450        40  78425  110 1600      5     5          85   1075
217 13500        33  75699   69 1900      3     5        185   1105
218 10950        41  75697   97 1400      3     5          69   1025
221 11950        43  74285  110 1600      5     5          85   1075
235 11900        41  61000  110 1600      5     5          85   1075

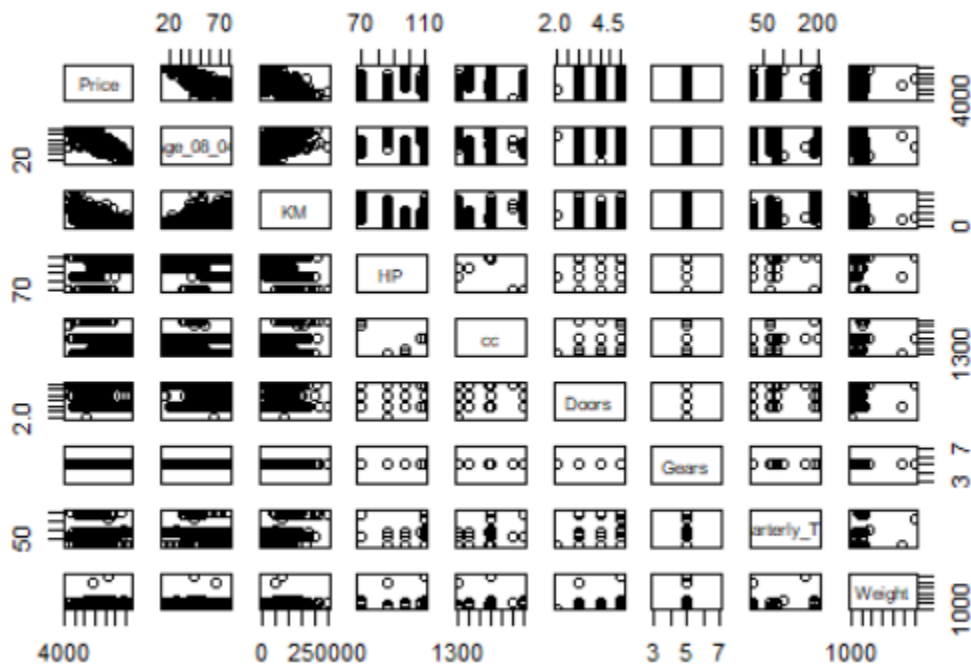
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236	11650	38	60829	110	1600	5	5	85	1075
237	10950	44	60500	110	1600	5	5	85	1075
238	13950	35	59500	69	1900	3	5	64	1110
239	13950	44	59000	110	1600	5	5	85	1110
240	11950	40	58954	110	1600	5	5	85	1080
241	10950	38	58798	110	1600	5	5	85	1075
242	12450	38	58363	110	1600	3	5	85	1055
245	11690	33	57269	110	1600	5	5	85	1075
246	13500	39	56001	110	1600	5	5	85	1075
248	12900	39	55678	110	1600	4	5	69	1030
254	14950	42	53719	110	1600	5	5	85	1105
257	13500	38	53000	110	1600	5	5	85	1075
261	11950	41	51732	97	1400	3	5	69	1025
265	12000	39	50000	97	1400	5	5	85	1060
270	10950	39	48945	110	1600	3	5	69	1040
298	12850	40	41339	110	1600	5	5	85	1080
299	13995	35	41000	110	1600	5	5	85	1075
309	11450	37	38812	97	1400	3	5	69	1025
313	11750	42	38078	97	1400	3	5	69	1025
314	11650	39	37782	97	1400	5	5	85	1060
315	9950	43	37576	97	1400	3	5	69	1030
316	13950	41	37533	110	1600	5	5	85	1075
317	12950	44	37389	110	1600	5	5	85	1080
318	10950	38	37320	97	1400	3	5	69	1025
319	9900	42	37000	97	1400	3	5	69	1025
322	10750	36	36269	110	1600	5	5	85	1075
323	13950	37	36074	110	1600	5	5	19	1075
325	12950	39	34599	110	1600	5	5	85	1075
326	11950	41	34000	110	1600	5	5	85	1075
328	12950	33	33591	110	1600	5	5	85	1075
333	11950	38	32781	110	1600	5	5	85	1075
334	11750	40	32532	110	1600	3	5	69	1040
339	12750	43	30742	110	1600	3	5	69	1040
340	11950	42	30190	110	1600	5	5	85	1075
341	11900	41	29716	116	1600	5	5	85	1075
344	11950	41	29056	97	1400	5	5	85	1060
346	14950	41	28571	110	1600	5	5	85	1090
351	11895	39	27170	97	1400	5	5	85	1060
353	12450	38	26262	110	1600	5	5	85	1075
361	12950	39	24444	110	1600	3	5	69	1040
373	11950	40	17051	97	1400	5	5	85	1060
386	9900	51	146736	110	1600	5	5	85	1080
402	10500	54	115046	69	1900	5	5	185	1140
405	9450	52	104805	97	1400	3	5	69	1025
407	10950	51	103018	69	1900	5	5	185	1140
418	10950	54	96100	110	1600	5	5	85	1080
433	10950	54	81905	110	1600	5	5	19	1105
458	10950	54	71276	110	1600	5	5	85	1080
461	9500	55	69813	97	1400	3	5	69	1025
471	10900	50	65471	97	1400	5	5	85	1060
477	10250	54	63792	110	1600	5	5	85	1075
517	11950	55	52141	110	1600	5	5	85	1070
522	11950	51	50000	86	1300	5	5	69	1045
523	9650	53	49969	110	1600	5	5	85	1075
525	11450	51	49473	110	1600	3	5	85	1055
526	10250	52	49432	110	1600	3	5	69	1050
527	11450	48	49417	110	1600	3	5	69	1045
529	10500	56	48731	110	1600	3	5	85	1055
531	9950	48	48071	97	1400	3	5	69	1025
532	10250	54	47852	110	1600	4	5	69	1030
534	11895	52	47689	110	1600	5	5	85	1075
535	12950	53	47451	110	1600	3	5	85	1055
536	11950	50	47219	110	1600	5	5	85	1080
542	12450	54	46230	110	1600	3	5	85	1055
546	10950	47	45850	97	1400	5	5	85	1060
551	10450	49	41710	110	1600	3	5	69	1040
557	11950	47	40361	110	1600	5	5	85	1090

```

561 10950      54 39291 110 1600      3      5      69 1040
563 8950       47 38900 97 1400       3      5      69 1025
567 10995      55 36406 110 1600      4      5      69 1035
572 11500      52 35823 110 1600      5      5      85 1075
577 11500      46 34000 110 1600      5      5      85 1075
581 11930      49 31999 97 1400       3      5      69 1030
593 9950       47 26221 97 1400       3      5      69 1025
611 6950       68 155720 86 1300       3      5      69 1015
630 7750       60 130270 110 1600      3      5      69 1050
638 7995       59 121626 86 1300      5      5      69 1050
650 9950       58 115715 110 1600      5      5      85 1070
658 8250       59 112827 86 1300      5      5      69 1040
668 9950       67 108793 110 1600      4      5      69 1035
670 9750       58 105942 86 1300      5      5      69 1040
685 8950       68 101001 110 1600      5      5      85 1075
702 9900       66 94606 110 1600      3      5      85 1065
715 8450       68 90727 110 1600      3      5      69 1050
746 8450       68 81965 86 1300      5      5      69 1035
785 8950       61 75609 86 1300      3      5      69 1015
[ reached 'max' / getOption("max.print") -- omitted 113 rows ]
> pairs(toyota)

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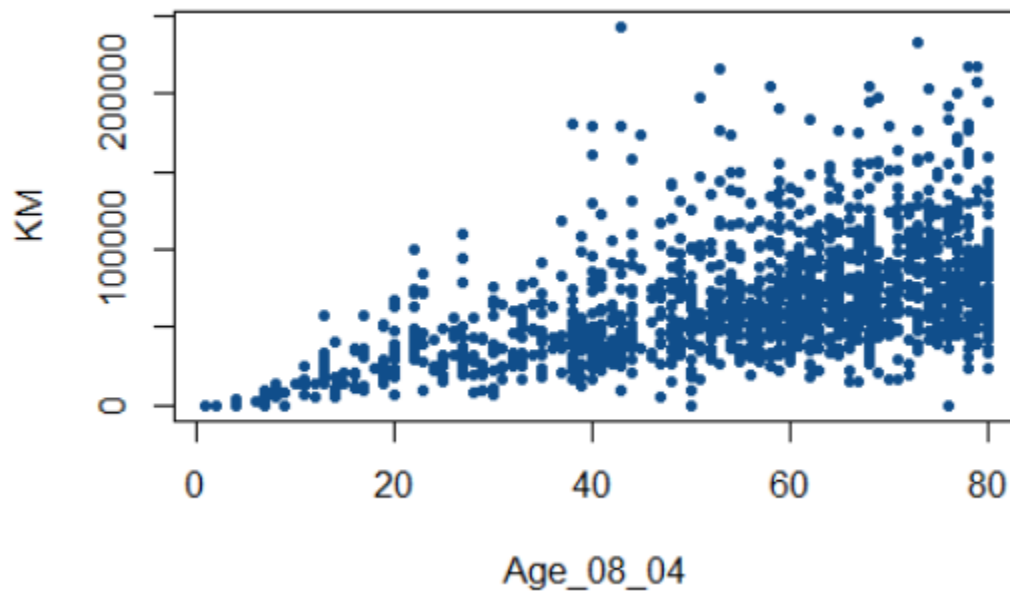
> cor(toyota)
      Price      Age_08_04      KM      HP      CC
Price      1.000000000 -0.846996943 -0.538470883 0.157646005 0.091034446
Age_08_04  -0.84699694  1.000000000  0.402267535 -0.006492632 -0.09779421
KM          -0.53847088  0.402267535  1.000000000 -0.116052242 0.17741298
HP           0.15764601 -0.006492632 -0.116052242 1.000000000 0.56366683
CC           0.09103446 -0.097794213  0.177412981 0.563666826 1.00000000
Doors       0.20700616 -0.129994245  0.001972592 0.174855245 0.21267160
Gears       NA          NA          NA          NA          NA
Quarterly_Tax 0.11719054 -0.168526990 0.220976692 -0.113292682 0.39182352
Weight      0.34401370 -0.296501116  0.004058400 0.240537983 0.49213793

      Doors      Gears      Quarterly_Tax      Weight
Price      0.207006158      NA      0.1171905      0.3440137
Age_08_04  -0.129994245      NA     -0.1685270 -0.2965011
KM          0.001972592      NA      0.2209767  0.0040584
HP          0.174855245      NA     -0.1132927  0.2405380
CC          0.212671597      NA      0.3918235  0.4921379

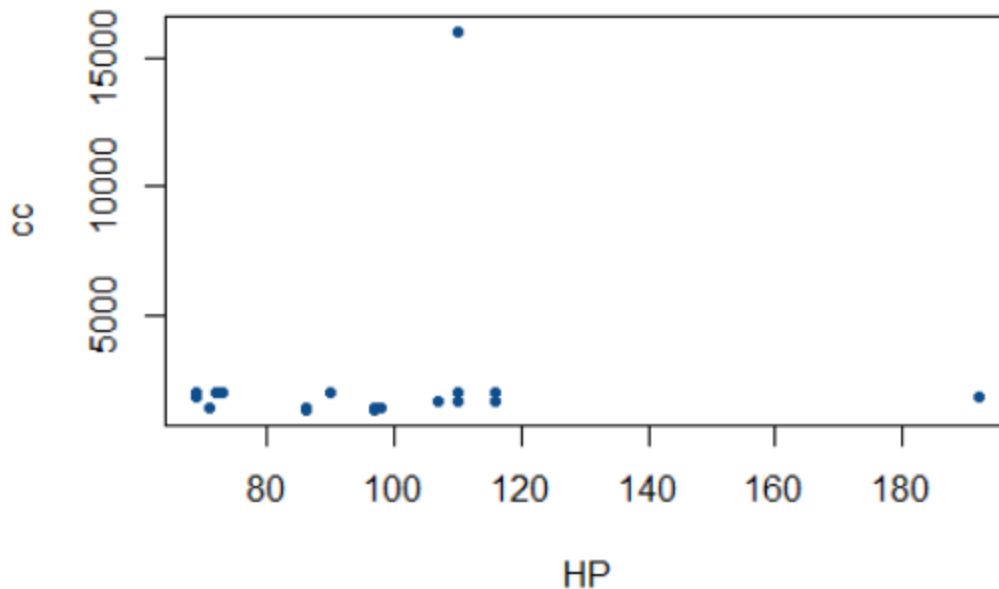
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Doors	1.000000000	NA	0.1962966	0.4268542
Gears	NA	1	NA	NA
Quarterly_Tax	0.196296612	NA	1.0000000	0.3673510

```
> plot(Age_08_04,KM, col="dodgerblue4",pch=20)
```



```
> plot(HP,cc, col="dodgerblue4",pch=20)
```



```
> toyota_model1 <- lm(Price~ Age_08_04+KM+HP+Gears+cc+Doors+Quarterly_Tax+Weight)
> summary(toyota_model1)
```

Call:
lm(formula = Price ~ Age_08_04 + KM + HP + Gears + cc + Doors +
Quarterly_Tax + weight)

Residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-9366.4 -793.3 -21.3 799.7 6444.0

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-5.573e+03	1.411e+03	-3.949	8.24e-05	***
Age_08_04	-1.217e+02	2.616e+00	-46.512	< 2e-16	***
KM	-2.082e-02	1.252e-03	-16.622	< 2e-16	***
HP	3.168e+01	2.818e+00	11.241	< 2e-16	***
Gears	5.943e+02	1.971e+02	3.016	0.00261	**
cc	-1.211e-01	9.009e-02	-1.344	0.17909	
Doors	-1.617e+00	4.001e+01	-0.040	0.96777	
Quarterly_Tax	3.949e+00	1.310e+00	3.015	0.00262	**
Weight	1.696e+01	1.068e+00	15.880	< 2e-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1342 on 1427 degrees of freedom
Multiple R-squared: 0.8638, Adjusted R-squared: 0.863
F-statistic: 1131 on 8 and 1427 DF, p-value: < 2.2e-16

> confint(toyota_model1, level = 0.95)

	Estimate	2.5 %	97.5 %
(Intercept)	-5.573106e+03	-8341.7278134	-2.804485e+03
Age_08_04	-1.216584e+02	-126.7893198	-1.165275e+02
KM	-2.081713e-02	-0.0232739	-1.836036e-02
HP	3.168091e+01	26.1523902	3.720942e+01
Gears	5.943199e+02	207.7709224	9.808690e+02
cc	-1.211003e-01	-0.2978224	5.562175e-02
Doors	-1.616641e+00	-80.0927231	7.685944e+01
Quarterly_Tax	3.949081e+00	1.3793225	6.518839e+00
Weight	1.695863e+01	14.8637367	1.905353e+01

> predict(toyota_model1, interval = "predict")

	fit	lwr	upr
1	16812.581	14165.395	19459.766
2	16272.355	13625.900	18918.810
3	16800.732	14153.283	19448.182
4	16426.497	13779.605	19073.388
5	16222.419	13574.926	18869.912
6	15510.717	12864.881	18156.553
7	16691.201	14041.029	19341.373
8	16715.985	14066.051	19365.918
9	20054.409	17374.109	22734.709
10	14540.371	11892.998	17187.744
11	20647.216	17959.179	23335.253
12	20759.284	18070.178	23448.390
13	20632.061	17943.990	23320.132
14	20093.399	17405.786	22781.012
15	19740.025	17052.163	22427.887
16	20547.076	17859.507	23234.645
17	19391.749	16710.806	22072.692
18	16387.876	13748.625	19027.128
19	15368.808	12725.514	18012.102
20	14770.221	12130.880	17409.562
21	14701.504	12061.925	17341.083
22	16479.220	13836.797	19121.644
23	15434.662	12794.874	18074.451
24	15936.959	13297.814	18576.104
25	15948.676	13309.577	18587.775
26	16380.415	13740.872	19019.958
27	16010.218	13370.936	18649.499
28	15623.887	12984.793	18262.981
29	15688.777	13049.480	18328.074
30	16133.508	13493.944	18773.072
31	15295.618	12648.926	17942.309
32	15878.091	13238.075	18518.106
33	15388.227	12749.099	18027.356
34	15443.646	12804.391	18082.901
35	15757.331	13117.207	18397.454

36	15229.063	12589.729	17868.396
37	15725.429	13085.925	18364.934
38	16281.003	13640.703	18921.303
39	14866.972	12228.316	17505.628
40	15430.070	12790.908	18069.232
41	15589.565	12949.165	18229.966
42	15085.172	12446.006	17724.338
43	15633.240	12992.925	18273.554
44	16623.588	13974.439	19272.737
45	17443.257	14794.132	20092.382
46	17914.256	15264.358	20564.155
47	17269.522	14620.864	19918.180
48	15214.902	12573.725	17856.079
49	18026.865	15377.995	20675.735
50	19385.807	16696.921	22074.694
51	18226.272	15577.079	20875.466
52	14615.552	11977.468	17253.636
53	16758.765	14118.187	19399.343
54	19592.793	16915.682	22269.904
55	16768.371	14129.154	19407.588
56	14402.818	11765.283	17040.353
57	15147.727	12509.631	17785.824
58	15395.416	12756.989	18033.842
59	17462.976	14822.516	20103.437
60	15719.896	13082.545	18357.247
61	15998.625	13359.518	18637.733
62	16121.780	13484.093	18759.467
63	15648.323	13011.068	18285.579
64	15833.120	13195.758	18470.482
65	15485.905	12847.650	18124.160
66	15154.077	12511.757	17796.397
67	16128.855	13491.280	18766.429
68	16144.345	13505.265	18783.425
69	19878.451	17224.898	22532.004
70	15793.546	13154.962	18432.131
71	15439.250	12801.064	18077.437
72	14104.852	11466.356	16743.347
73	16174.395	13536.795	18811.995
74	16067.922	13429.000	18706.845
75	16191.160	13553.549	18828.771
76	16545.073	13907.100	19183.046
77	15883.099	13245.654	18520.544
78	16152.345	13514.879	18789.811
79	15928.055	13290.772	18565.339
80	15345.942	12707.717	17984.167
81	15885.600	12238.288	19532.913
82	15981.659	13344.292	18619.027
83	16058.257	13419.316	18697.198
84	16978.204	14337.351	19619.057
85	16091.335	13452.324	18730.347
86	16596.324	13957.975	19234.673
87	15488.612	12849.646	18127.579
88	18118.320	15468.072	20768.568
89	15895.732	13254.391	18537.073
90	19660.626	17004.710	22316.543
91	15852.638	13211.768	18493.507
92	19080.875	16425.601	21736.149
93	19631.148	16975.724	22286.573
94	16160.336	13519.907	18800.765
95	16917.928	14277.505	19558.352
96	19595.277	16939.434	22251.121
97	16363.056	13722.439	19003.673
98	16435.645	13795.038	19076.253
99	18165.860	15523.489	20808.231
100	16599.895	13959.064	19240.727
101	17098.517	14458.173	19738.861
102	16576.119	13935.450	19216.788
103	16931.312	14281.137	19581.488

104	18085.866	15443.837	20727.894
105	19024.009	16380.715	21667.304
106	16689.614	14048.820	19330.409
107	16736.425	14093.114	19379.736
108	17010.954	14369.663	19652.244
109	17176.962	14536.726	19817.198
110	26552.905	23852.476	29253.334
111	26469.657	23769.837	29169.478
112	26521.700	23821.503	29221.897
113	22883.517	20224.143	25542.891
114	22883.517	20224.143	25542.891
115	22224.962	19569.588	24880.335
116	21532.455	18876.337	24188.572
117	21262.093	18607.458	23916.728
118	18908.113	16264.921	21551.305
119	18462.012	15812.807	21111.216
120	19918.165	17266.523	22569.806
121	17157.190	14515.383	19798.997
122	18831.415	16181.591	21481.238
123	17389.985	14749.686	20030.283
124	16933.045	14294.160	19571.930
125	17362.616	14723.185	20002.047
126	17484.524	14844.864	20124.184
127	15804.526	13160.417	18448.636
128	16291.903	13652.408	18931.399
129	17107.074	14466.257	19747.891
130	16708.657	14062.427	19354.887
131	16341.302	13701.828	18980.777
132	16400.215	13760.749	19039.681
133	16529.284	13889.612	19168.956
134	17304.508	14657.895	19951.120
135	16416.806	13777.339	19056.273
136	16563.008	13923.336	19202.680
137	16996.341	14355.930	19636.753
138	17390.344	14743.898	20036.789
139	21602.659	18926.274	24279.044
140	17268.513	14629.825	19907.201
141	16550.285	13910.758	19189.812
142	20663.266	17987.341	23339.192
143	18152.846	15512.802	20792.891
144	17127.776	14488.510	19767.041
145	17933.636	15294.028	20573.244
146	17088.608	14448.248	19728.968
147	17983.753	15344.047	20623.458
148	18182.823	15542.789	20822.858
149	17487.429	14848.533	20126.325
150	18445.503	15804.836	21086.170
151	16660.366	14020.719	19300.014
152	17514.283	14875.367	20153.200
153	17950.914	15309.057	20592.771
154	18182.374	15542.127	20822.621
155	18324.588	15684.535	20964.640
156	16932.555	14292.395	19572.714
157	17540.969	14901.956	20179.982
158	18327.639	15687.144	20968.134
159	17862.498	15223.160	20501.835
160	18896.424	16254.978	21537.870
161	17582.603	14943.556	20221.650
162	17480.387	14840.998	20119.776
163	18671.919	16030.885	21312.953
164	17834.804	15195.171	20474.437
165	17987.299	15345.528	20629.070
166	18352.355	15712.350	20992.359
167	18363.617	15723.596	21003.638
168	18708.174	16067.306	21349.042
169	18616.489	15976.086	21256.892
170	17368.244	14721.507	20014.981
171	17892.165	15246.143	20538.186

172	18978.219	16337.017	21619.422
173	18270.629	15628.198	20913.061
174	18272.232	15629.800	20914.665
175	19003.450	16362.242	21644.657
176	19028.722	16387.506	21669.937
177	18807.109	16165.810	21448.407
178	18944.380	16302.810	21585.950
179	19103.122	16461.864	21744.381
180	19388.073	16746.301	22029.845
181	18093.868	15447.158	20740.578
182	18592.694	15949.773	21235.616
183	19205.670	16561.349	21849.991
184	19936.846	17293.976	22579.716
185	18935.063	16284.288	21585.839
186	18865.432	16216.585	21514.279
187	8614.323	5945.965	11282.681
188	12119.044	9466.664	14771.424
189	12653.444	10001.810	15305.078
190	10891.287	8228.491	13554.083
191	10601.510	7951.882	13251.137
192	9786.497	7129.561	12443.433
193	10349.538	7697.424	13001.651
194	11835.869	9191.258	14480.480
195	11852.374	9208.393	14496.355
196	12285.451	9642.292	14928.610
197	11003.730	8358.540	13648.920
198	14253.390	11609.738	16897.041
199	10642.232	8000.627	13283.838
200	13634.338	10986.337	16282.340
201	11879.079	9240.656	14517.502
202	11076.671	8435.628	13717.714
203	12218.675	9580.326	14857.024
204	12742.301	10097.556	15387.047
205	12305.536	9662.448	14948.623
206	11457.587	8818.263	14096.910
207	12603.860	9965.743	15241.978
208	11604.618	8966.867	14242.370
209	12589.415	9951.774	15227.056
210	14246.312	11598.823	16893.801
211	12733.334	10089.931	15376.737
212	14723.396	12079.759	17367.032
213	13982.294	11344.207	16620.382
214	12748.831	10111.273	15386.389
215	15032.919	12387.668	17678.170
216	13623.422	10984.419	16262.425
217	13228.840	10583.485	15874.195
218	11388.446	8749.659	14027.234
219	11041.187	8403.130	13679.243
220	13077.623	10439.973	15715.272
221	12470.039	9833.241	15106.836
222	21816.422	19005.044	24627.801
223	12861.132	10223.931	15498.333
224	12708.501	10055.625	15361.377
225	13507.527	10869.474	16145.580
226	13213.226	10575.972	15850.479
227	12962.521	10322.888	15602.154
228	13109.058	10470.600	15747.517
229	12878.854	10242.531	15515.176
230	12905.003	10267.054	15542.951
231	11278.398	8640.880	13915.915
232	13681.722	11039.008	16324.435
233	11651.285	9013.705	14288.866
234	12417.037	9779.254	15054.820
235	12989.911	10353.403	15626.419
236	13358.446	10721.509	15995.383
237	12635.344	9999.194	15271.495
238	12929.695	10280.288	15579.101
239	13260.122	10624.216	15896.028

240	13238.954	10602.558	15875.351
241	13400.726	10763.860	16037.591
242	13073.842	10435.862	15711.821
243	12234.568	9597.238	14871.898
244	15372.733	12726.731	18018.735
245	14040.847	11403.152	16678.542
246	13337.293	10700.652	15973.934
247	12489.087	9851.844	15126.329
248	12519.310	9881.404	15157.215
249	13029.863	10393.979	15665.747
250	12984.829	10348.563	15621.094
251	14080.795	11443.177	16718.413
252	12055.117	9417.990	14692.243
253	12897.040	10260.892	15533.188
254	13528.581	10892.723	16164.440
255	13125.719	10484.809	15766.629
256	13027.504	10391.264	15663.744
257	13521.423	10884.709	16158.138
258	11515.026	8877.751	14152.301
259	11516.775	8879.500	14154.049
260	14151.677	11514.175	16789.180
261	11887.329	9249.565	14525.093
262	13444.043	10807.494	16080.592
263	12376.373	9738.994	15013.752
264	13327.235	10690.807	15963.663
265	12820.205	10183.026	15457.384
266	13594.283	10957.623	16230.943
267	12952.623	10316.716	15588.530
268	13431.763	10792.817	16070.710
269	15378.573	12732.770	18024.377
270	12830.674	10192.745	15468.603
271	13786.136	11139.447	16432.824
272	13621.408	10984.761	16258.055
273	13561.055	10914.437	16207.673
274	13287.206	10648.462	15925.950
275	13017.217	10381.078	15653.356
276	13274.065	10637.753	15910.377
277	12886.383	10249.192	15523.574
278	12877.534	10239.653	15515.414
279	11749.382	9110.813	14387.950
280	13324.397	10686.703	15962.090
281	13383.779	10745.995	16021.562
282	13510.993	10874.760	16147.225
283	13072.775	10429.968	15715.581
284	13940.912	11304.954	16576.871
285	13317.011	10680.691	15953.330
286	13564.616	10928.097	16201.134
287	13448.182	10811.767	16084.598
288	12519.162	9880.728	15157.596
289	12332.278	9695.544	14969.011
290	13108.146	10471.963	15744.329
291	13310.518	10672.158	15948.879
292	13602.649	10966.124	16239.173
293	13610.652	10972.569	16248.735
294	14341.571	11704.248	16978.895
295	13336.914	10700.811	15973.017
296	13102.029	10464.052	15740.006
297	13948.029	11297.316	16598.742
298	13605.648	10969.381	16241.915
299	14136.204	11499.189	16773.219
300	13334.448	10696.902	15971.994
301	13918.763	11281.996	16555.530
302	12865.458	10228.147	15502.769
303	12855.101	10217.970	15492.231
304	12385.023	9746.962	15023.085
305	12430.160	9793.278	15067.042
306	12796.738	10159.630	15433.846
307	11787.397	9150.035	14424.760


```

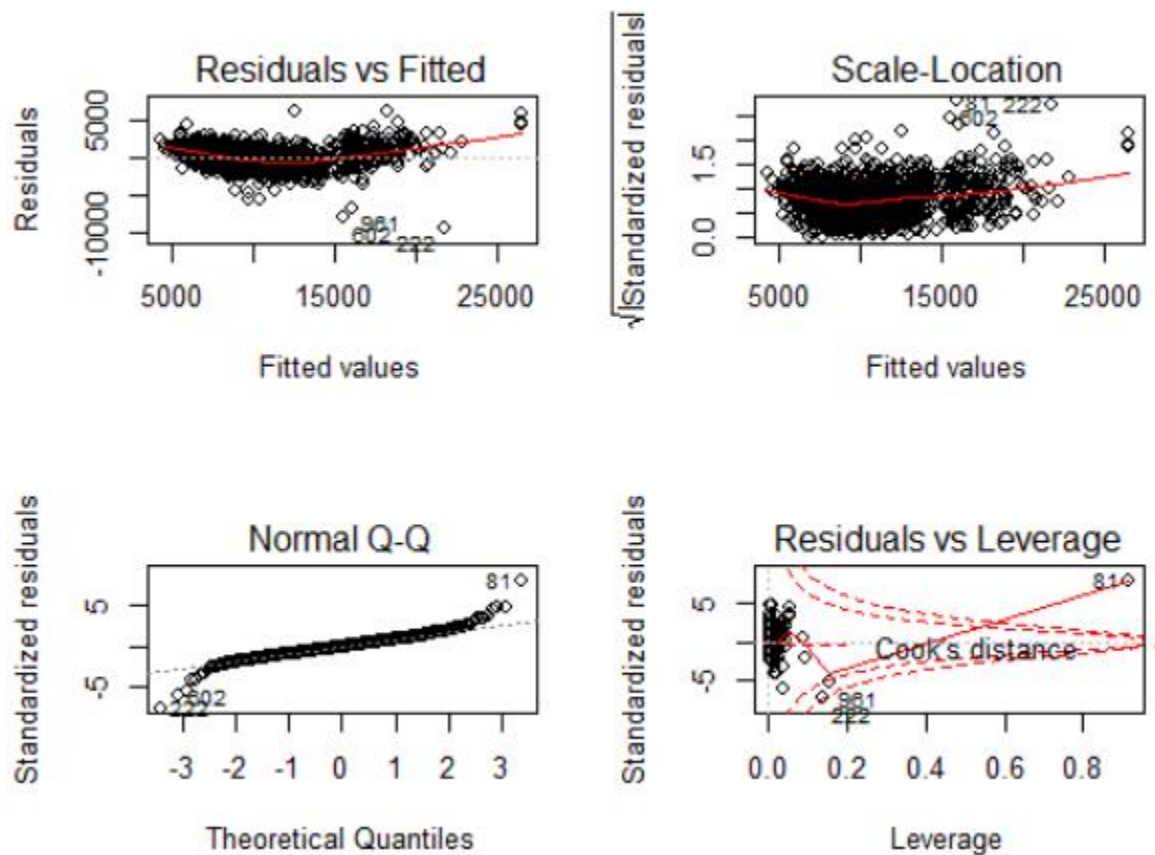
308 12674.141 10036.744 15311.538
309 12642.920 10004.503 15281.336
310 13333.203 10696.861 15969.546
311 13661.563 11025.253 16297.873
312 13178.926 10542.830 15815.022
313 12049.908 9412.278 14687.537
314 13074.549 10437.199 15711.898
315 12023.492 9386.200 14660.785
316 13478.427 10841.992 16114.862
317 13201.242 10565.113 15837.372
318 12552.321 9914.072 15190.569
319 12072.348 9434.697 14709.999
320 12865.524 10226.262 15504.786
321 13874.595 11238.469 16510.721
322 14113.031 11476.111 16749.952
323 13734.793 11094.312 16375.275
324 12490.486 9853.266 15127.706
325 13782.821 11146.164 16419.478
326 13551.974 10915.440 16188.507
327 12142.648 9504.913 14780.383
328 14533.755 11896.419 17171.091
329 14297.370 11660.286 16934.455
330 13327.121 10690.654 15963.589
331 13906.471 11237.465 16575.477
332 14388.762 11751.883 17025.641
333 13942.325 11305.536 16579.113
[ reached getOption("max.print") -- omitted 1103 rows ]

```

```

> layout(matrix(c(1,2,3,4),2,2))
> plot(toyota_model1)

```



```

> model.carcc <- lm(Price ~ cc)
> summary(model.carcc) # Its significant to output

```

```

Call:
lm(formula = Price ~ cc)

Residuals:
    Min       1Q   Median       3Q      Max
-7360.2 -2305.8  -855.8   1194.2 21312.1

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 9027.5548   365.5755   24.694 < 2e-16 ***
cc           1.0802     0.2239    4.825 1.55e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3599 on 1434 degrees of freedom
Multiple R-squared:  0.01597, Adjusted R-squared:  0.01529
F-statistic: 23.28 on 1 and 1434 DF, p-value: 1.551e-06

> model.cardoor <- lm(Price ~ Doors)
> summary(model.cardoor)

Call:
lm(formula = Price ~ Doors)

Residuals:
    Min       1Q   Median       3Q      Max
-7062.8 -2251.7  -915.3   958.0 21087.2

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 7885.01     409.44   19.258 < 2e-16 ***
Doors        705.56      98.79    7.142 1.46e-12 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3565 on 1434 degrees of freedom
Multiple R-squared:  0.03435, Adjusted R-squared:  0.03367
F-statistic: 51 on 1 and 1434 DF, p-value: 1.461e-12

> model.car <- lm(Price ~ cc + Doors)
> summary(model.car)

Call:
lm(formula = Price ~ cc + Doors)

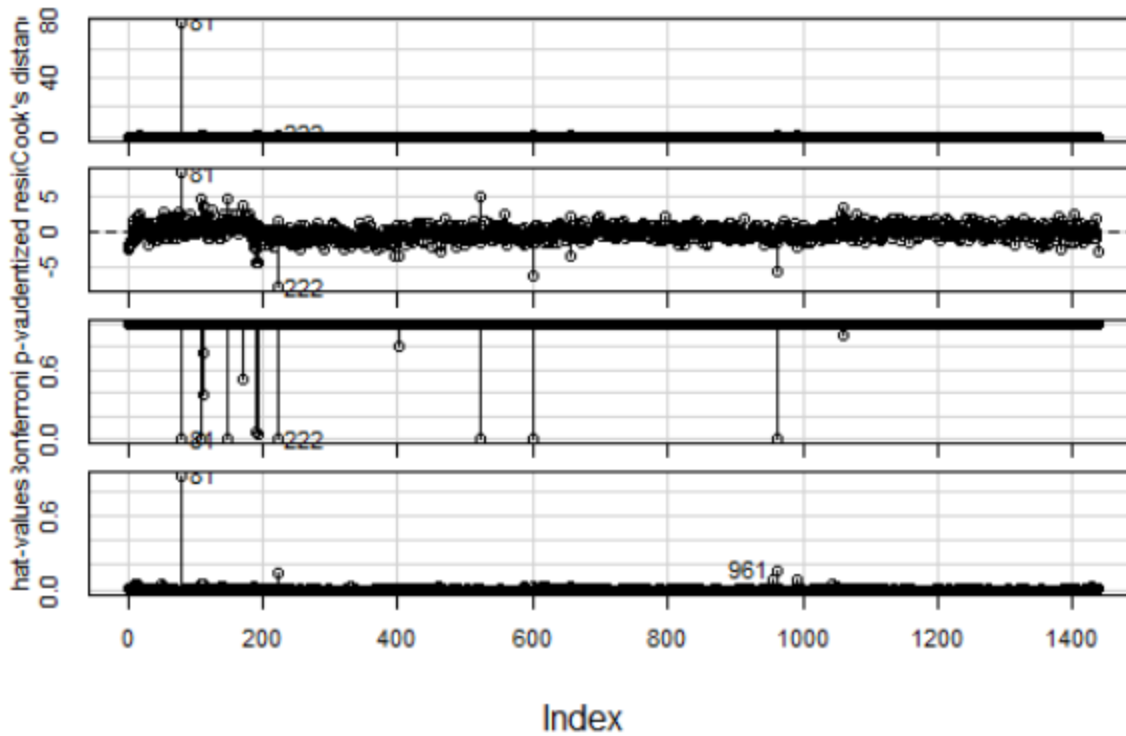
Residuals:
    Min       1Q   Median       3Q      Max
-7243.9 -2273.6  -821.3   1054.4 20714.1

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 6509.4211   515.7732   12.621 < 2e-16 ***
cc           0.9597     0.2211    4.340 1.52e-05 ***
Doors        671.3973    98.5009    6.816 1.37e-11 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3543 on 1433 degrees of freedom
Multiple R-squared:  0.04688, Adjusted R-squared:  0.04555
F-statistic: 35.24 on 2 and 1433 DF, p-value: 1.15e-15
> library(car)
> influenceIndexPlot(toyota_model1, id.n=3)

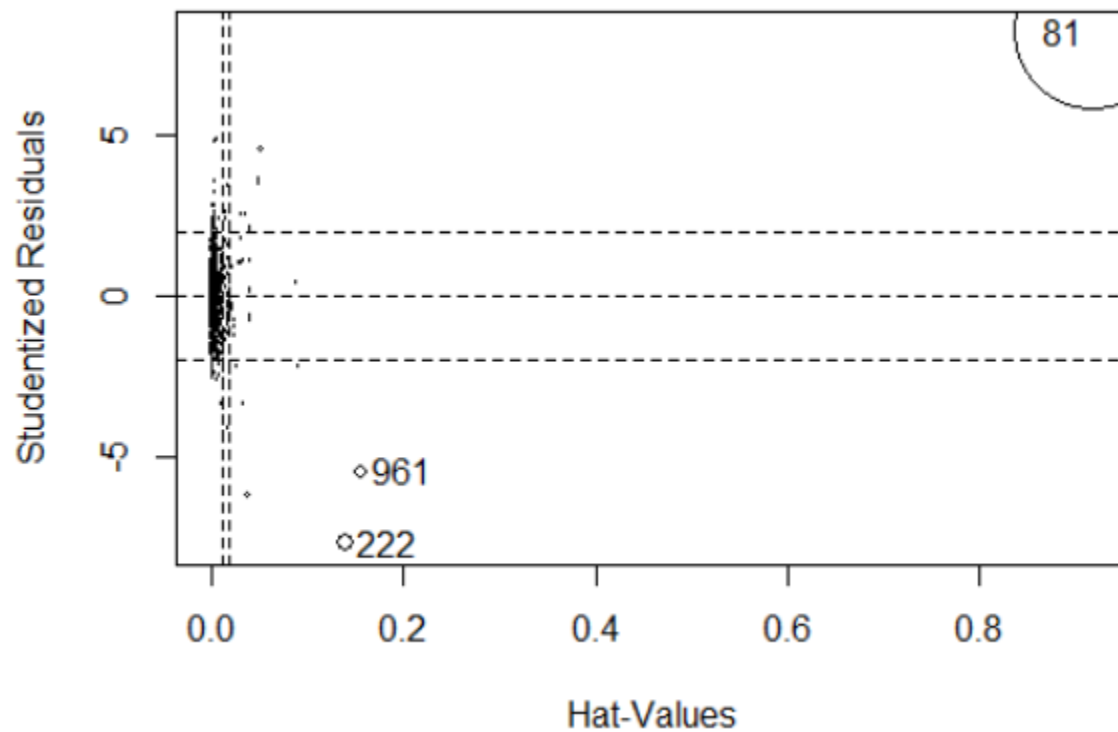
```

Diagnostic Plots



```
> influencePlot(toyota_model1, id.n=3)
```

	StudRes	Hat	CookD
81	8.164500	0.9182368	79.5201062
222	-7.673262	0.1397116	1.0210312
961	-5.456195	0.1572484	0.6049996



```
> toyota_model2 <- lm(Price~Age_08_04+KM+HP+cc+Gears+Doors+Quarterly_Tax+Weight, data = toyota[-c(81),])
> summary(toyota_model2)
```

```
Call:
lm(formula = Price ~ Age_08_04 + KM + HP + cc + Gears + Doors +
    Quarterly_Tax + Weight, data = toyota[-c(81), ])
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-4559.3  -667.7    -7.5    667.5   2913.6
```

```
Coefficients: (1 not defined because of singularities)
```

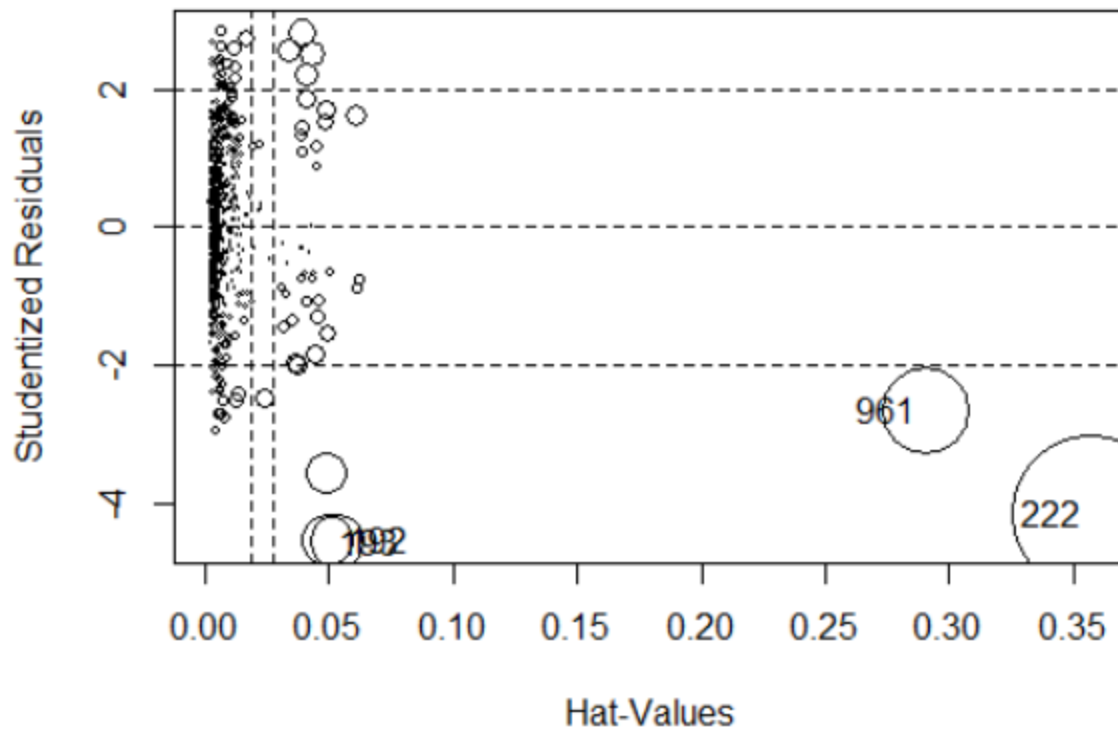
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	9.100e+03	1.120e+03	8.127	1.33e-15 ***
Age_08_04	-1.093e+02	2.592e+00	-42.146	< 2e-16 ***
KM	-1.586e-02	1.234e-03	-12.850	< 2e-16 ***
HP	3.428e+01	4.088e+00	8.386	< 2e-16 ***
cc	-1.993e+00	3.667e-01	-5.436	6.90e-08 ***
Gears	NA	NA	NA	NA
Doors	1.284e+02	3.893e+01	3.299	0.001007 **
Quarterly_Tax	5.410e+00	1.551e+00	3.489	0.000508 ***
Weight	6.606e+00	1.173e+00	5.631	2.35e-08 ***

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 1035 on 969 degrees of freedom
Multiple R-squared:  0.799,    Adjusted R-squared:  0.7976
F-statistic: 550.4 on 7 and 969 DF,  p-value: < 2.2e-16
```

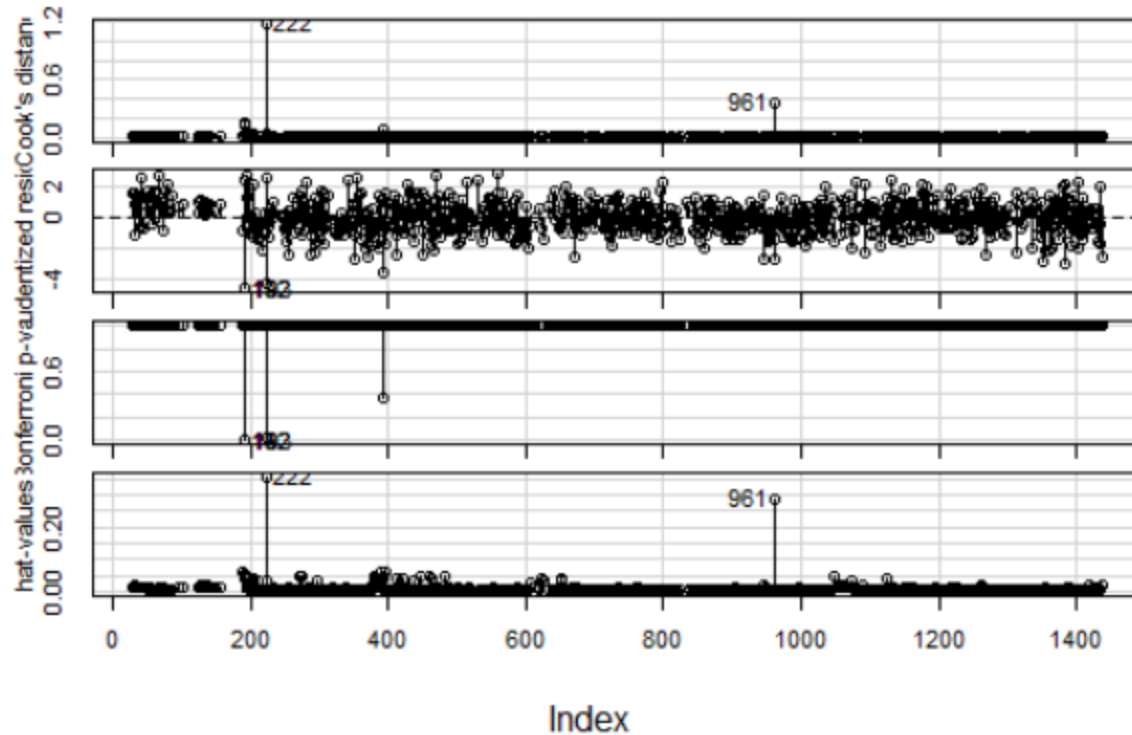
```
> influencePlot(toyota_model2)
```

	StudRes	Hat	CookD
192	-4.546190	0.05363839	0.1435150
193	-4.567312	0.05014511	0.1348936
222	-4.183257	0.35728917	1.1956684
961	-2.665184	0.29045036	0.3611825



```
> influenceIndexPlot(toyota_model2)
```

Diagnostic Plots



```
> predict(toyota_model2)
```

28	31	32	33	34	35	36
14100.281	14066.443	14784.594	14328.564	14387.346	14692.583	14223.850
37	38	40	41	42	43	48
14618.603	15075.026	14360.445	14564.758	14097.657	14598.035	14475.436
52	55	56	57	58	60	62
13886.312	15049.664	13663.698	14324.907	14546.743	14353.019	14708.900
66	68	70	71	72	74	76
14177.008	15183.605	14866.648	14547.026	13779.818	15108.818	15192.372
79	80	83	85	97	102	123
14622.902	14442.816	15068.339	15093.542	15203.776	15366.115	15985.155
125	127	128	130	131	132	133
15819.906	14771.951	15329.149	15576.738	15366.788	15411.675	15526.574
134	135	136	138	141	146	156
15711.644	15424.316	15552.269	15906.691	15526.018	16002.413	15928.293
187	191	192	193	194	195	196
7844.837	9440.178	8880.324	9309.320	10418.945	10414.963	11967.627
197	199	200	201	202	203	204
10002.850	10899.287	12953.289	11542.096	11263.414	11833.960	11122.523
205	206	207	209	210	213	216
10727.124	11112.690	12160.559	12101.421	13440.055	13120.730	13053.297
219	220	222	223	224	225	226
11170.146	12554.648	15890.903	12360.384	12363.801	12931.877	12657.967
227	228	229	231	232	233	234
12439.937	12987.979	12305.394	11350.884	12939.274	11636.539	11893.396
243	247	250	251	252	253	255
11721.252	11900.161	12417.714	13401.782	11808.891	12334.267	12416.293
256	258	259	260	262	263	264
12450.229	11531.178	11532.510	13455.789	12817.276	12086.781	12711.718
266	267	268	271	272	273	274
12948.306	12328.486	12814.024	11982.539	12968.973	11777.928	12896.676
275	276	277	278	279	280	281
12425.833	12654.649	12735.527	12308.951	11985.590	12609.675	13180.739
282	283	284	285	286	287	288
12820.155	12561.232	12989.853	12687.370	12909.143	12803.872	12412.162
289	290	291	292	293	294	295
12230.550	12495.115	12688.528	12938.122	12870.618	13600.475	12654.403

296	297	300	301	302	303	304
12496.558	13210.546	12600.776	13212.094	12235.061	12169.316	12280.645
305	306	307	308	310	311	312
12305.129	12634.109	11738.705	12104.307	12683.150	12934.878	12500.912
320	321	324	327	329	330	332
12005.608	13034.045	11931.259	12042.496	13533.681	12661.958	13571.741
335	336	337	338	342	343	345
13510.034	12979.026	13430.970	12372.577	12316.725	12437.339	13824.244
347	348	349	350	352	354	355
12490.465	13286.941	12179.535	13847.639	12719.917	13175.025	12245.448
356	357	358	359	360	362	363
13259.700	13004.533	13499.761	12830.762	12633.628	12959.723	12304.381
364	365	366	367	368	369	370
13140.350	13370.768	12468.915	12993.143	12341.639	13117.827	12777.436
371	372	374	375	376	377	378
12818.490	13775.691	13679.911	13289.026	13333.637	13433.846	12882.540
379	380	381	383	384	387	388
7180.560	7711.235	7781.974	8878.483	9169.808	8785.310	11283.114
389	390	392	393	394	395	396
8523.441	8331.545	9025.497	10448.067	8031.880	10033.190	10774.690
397	399	400	401	404	406	408
8338.605	9538.378	9673.278	9548.189	10674.866	10344.488	11159.769
409	410	411	412	413	414	415
10658.068	10410.860	10359.198	10239.557	10051.877	10791.151	10442.027
416	420	421	422	423	424	425
10366.924	9418.850	10693.936	9943.338	9632.550	11082.467	10792.250
426	427	428	429	430	431	432
11009.788	10622.511	10286.534	11096.930	11104.242	10534.408	10422.533
434	435	436	437	438	439	440
10967.823	10573.738	10828.920	12397.092	11394.218	10067.846	10787.806
441	442	443	444	447	448	449
10280.570	11068.285	11186.648	10825.169	10724.101	9826.418	9864.600
450	451	452	453	454	455	456
11350.091	11280.394	11585.901	10683.418	10657.071	10986.696	10232.011
457	459	460	463	464	465	467
10368.520	9784.036	10405.961	11642.901	10622.690	10931.873	11053.659
468	469	470	472	473	474	475
10806.819	11181.731	11036.649	10008.937	10449.596	10378.876	11048.121
476	479	481	482	483	484	485
10249.648	10475.450	10608.604	10397.656	11019.374	10263.035	10273.138
486	487	489	490	491	492	493
11288.549	11444.210	10290.808	10846.869	11280.710	11029.928	10656.712
494	495	496	497	498	499	500
11434.457	10574.398	10732.917	11057.034	10441.665	10877.715	10454.892
501	502	503	504	505	506	507
11431.862	11550.890	10608.412	10434.549	11021.348	11099.114	10735.120
508	509	510	511	512	513	514
10859.340	11558.521	11861.649	11208.337	11499.066	11501.287	10968.545
515	516	518	519	520	521	528
10214.370	10454.276	10221.476	11686.492	11656.029	10471.704	10481.760
530	533	537	538	539	540	541
11251.216	10838.774	10985.029	11096.180	10453.896	10987.932	12014.343
543	544	545	547	548	549	550
10961.562	10972.160	11694.372	11080.833	10449.101	10175.414	11269.378
552	553	554	555	556	558	559
10821.857	11712.420	11621.744	11627.117	11635.591	10836.409	12148.744
560	562	564	565	566	568	569
11825.648	10646.177	11315.072	10452.082	10677.899	11956.839	11632.892
570	571	573	574	575	576	578
11993.683	12107.800	10487.468	11694.554	11257.630	11759.877	11260.667
579	580	582	583	584	585	586
10840.525	12368.692	10982.388	10554.561	12224.774	10916.643	11694.716
588	589	590	591	592	594	595
11347.031	11591.672	10719.327	11639.029	11526.336	11917.158	11344.897
596	597	598	599	600	601	603
10739.930	11630.683	11321.786	11682.362	12147.472	12376.090	10995.559
606	612	621	623	625	634	639
6435.056	7846.976	8301.351	9634.214	9321.662	8734.744	9082.273

641	642	643	646	647	649	651
8170.831	8527.408	8084.560	8390.466	7953.791	8543.587	10006.691
652	653	654	656	657	659	663
8241.731	9751.742	9071.269	9212.614	7839.550	8644.526	9429.329
664	665	666	667	669	671	672
8198.025	9373.823	8761.055	8724.603	8420.120	8538.823	8903.533
673	674	675	676	677	678	679
8867.610	7984.172	7571.409	9009.077	9362.069	9014.714	8929.272
681	682	686	687	688	689	690
9092.555	8839.771	9589.606	9188.767	9048.524	8942.925	9221.283
691	694	695	696	698	699	700
8398.767	8277.930	8200.009	8533.886	9013.363	9289.486	8440.495
701	703	704	706	707	709	712
8768.253	8568.086	9301.731	9075.163	9634.723	9244.949	8935.669
714	716	717	718	719	720	721
10105.011	9175.318	9429.866	8580.581	9656.534	8538.723	9562.433
722	723	724	725	726	727	728
9258.810	9745.691	8858.421	8784.215	8426.263	9758.134	9552.436
729	730	732	733	734	735	736
9518.839	8601.238	9254.623	9083.336	8628.804	9382.679	9770.320
737	738	739	740	741	743	744
9115.866	9747.455	8275.342	9201.701	8616.376	9992.018	9529.221
745	747	749	750	751	752	753
8518.591	8606.613	9486.974	8423.883	9940.401	10447.347	9028.525
755	756	757	758	759	760	761
8791.241	8873.869	9479.255	9152.004	9034.124	9842.473	9082.928
762	763	764	765	766	767	768
8151.421	8852.267	8335.583	9884.929	10074.460	9459.043	9895.934
770	771	772	773	774	775	776
8246.014	8685.642	8580.830	10044.777	9330.770	8744.289	9045.824
777	778	779	780	781	782	783
9384.597	8269.678	8270.012	9423.328	9428.625	8419.260	10231.106
784	788	789	790	791	792	793
9096.474	9266.262	8359.141	9888.746	9191.757	8303.621	9235.212
794	795	796	797	798	799	800
9816.539	10210.790	9930.391	9575.357	8768.694	9207.529	9098.498
801	805	810	811	815	816	818
8916.045	8765.836	8786.456	9551.225	9695.915	9301.987	9446.065
819	822	825	833	838	844	845
9642.342	9301.512	8381.167	9987.192	8925.216	10030.196	8772.370
848	849	850	851	853	854	856
9521.675	9583.048	10367.772	8483.445	9353.341	9391.841	9149.561
857	859	861	862	864	865	866
9425.666	10083.610	9044.686	9725.468	9344.281	9440.734	8696.727
868	869	870	871	872	873	875
9379.203	9493.659	9488.191	9285.390	10121.994	9068.154	9288.103
876	877	879	881	882	883	885
9468.935	9113.378	9382.443	10170.738	9000.082	9001.097	10575.406
886	887	888	890	891	893	894
10139.806	9960.417	9599.061	9961.035	9396.353	10181.555	8856.053
895	896	897	898	899	900	901
9966.847	9751.967	8876.542	8758.284	8867.537	9595.435	8879.210
902	903	904	905	907	908	909
9557.761	9220.383	9490.767	10251.777	9133.302	9341.967	9711.001
910	911	912	913	915	917	918
8894.501	9897.114	9970.755	9459.017	10119.886	8967.358	10252.901
920	923	925	926	927	928	929
10204.440	9589.483	9522.584	9582.390	9893.196	8740.619	10081.775
930	931	932	933	934	935	936
10262.501	9405.038	10159.053	10551.520	9877.243	8946.842	10785.266
937	938	939	941	942	943	944
10130.764	9552.435	9186.621	10011.321	9975.157	10801.127	10116.432
945	946	947	948	950	951	952
10583.655	10266.204	9942.125	9027.262	9544.182	8763.231	10315.614
953	954	955	956	958	959	960
10018.140	8879.098	9914.835	10219.621	9472.888	9010.287	10379.856
961	963	964	966	967	968	969
11705.643	10424.816	10318.307	9844.690	9850.850	9934.878	10096.942

970	971	972	973	974	975	976
9811.585	9282.530	9127.001	9416.577	9835.789	10104.219	9073.510
979	980	981	982	983	984	986
9550.510	9096.746	10692.163	10435.334	10069.855	9385.159	10213.269
987	988	989	990	991	993	994
9810.022	9278.379	8786.292	10711.087	10608.052	9423.007	10975.600
995	996	997	998	999	1000	1001
9246.429	9269.240	9897.315	10243.132	10206.348	10121.453	9760.341
1002	1004	1005	1007	1008	1009	1010
9286.041	10492.780	10584.560	10691.889	10232.704	9560.102	10344.447
1011	1012	1013	1014	1017	1018	1019
10710.880	9940.125	9584.372	9248.204	9259.577	9392.164	10593.111
1020	1021	1022	1023	1024	1025	1026
9843.229	11009.097	8983.912	10646.499	9751.645	10995.252	9318.184
1028	1029	1030	1031	1032	1033	1034
11128.032	9484.926	11062.486	9040.172	10111.621	10877.828	10249.116
1035	1036	1037	1038	1039	1041	1042
9643.429	10405.378	10131.384	11151.848	9803.621	9685.943	10327.710
1043	1048	1057	1058	1061	1062	1063
9581.809	6832.523	7115.213	5996.314	6747.838	5832.981	5642.628
1065	1066	1068	1069	1073	1076	1077
6755.462	6431.317	6857.120	6392.966	8464.449	6407.824	6677.681
1078	1080	1085	1087	1088	1089	1090
6101.580	6580.951	7742.608	6881.348	7229.441	6323.319	7394.086
1091	1092	1094	1095	1096	1097	1099
7075.987	7370.717	7533.523	7222.352	7078.297	7193.546	7750.231
1100	1101	1102	1103	1104	1105	1106
7605.668	7324.100	7552.979	7705.474	6883.787	6654.337	7024.368
1107	1108	1111	1112	1113	1114	1115
7387.630	7511.696	7385.340	8290.816	7459.981	7592.415	7719.288
1116	1118	1120	1121	1122	1123	1124
7793.023	7183.963	7985.980	7277.987	7175.047	7783.890	7888.872
1125	1126	1127	1128	1129	1130	1131
6997.060	7299.653	6920.861	8019.712	7597.250	7914.218	7702.184
1132	1133	1134	1135	1136	1137	1138
7485.391	8082.051	7209.549	7827.298	7375.438	6840.340	6968.708
1140	1141	1142	1143	1144	1145	1146
7639.848	7153.338	7698.523	6557.817	8168.522	6890.334	8042.508
1147	1148	1149	1150	1151	1152	1153
7677.550	8152.645	6963.476	7465.716	7623.515	7290.254	7617.499
1154	1157	1158	1159	1160	1161	1162
7593.374	7102.073	8194.966	8345.318	7753.970	8062.710	7495.084
1163	1164	1165	1166	1167	1168	1169
7022.148	7783.286	8429.281	8435.769	8328.837	7308.469	6876.248
1170	1171	1172	1173	1174	1175	1176
8343.725	7809.060	7802.219	7813.152	7171.815	7138.232	7718.677
1177	1178	1179	1180	1181	1182	1183
7623.355	7202.110	8542.703	7269.818	7997.485	6708.022	7776.904
1184	1185	1186	1187	1188	1189	1190
7108.623	7629.495	7815.302	7880.594	7737.869	8119.275	7354.901
1191	1192	1193	1194	1195	1197	1199
7075.830	7169.435	7080.668	8421.150	7837.183	7255.260	7306.993
1200	1202	1204	1205	1206	1207	1208
8999.495	8615.125	7786.753	7582.656	7337.034	8015.442	8158.374
1209	1210	1211	1212	1213	1214	1216
8378.196	7504.173	7565.263	6800.493	8641.137	7390.068	7001.733
1218	1219	1220	1221	1222	1223	1224
7754.622	8555.060	8049.670	8500.186	8053.033	7873.376	8208.970
1225	1226	1227	1228	1229	1230	1231
8091.645	7957.500	7812.477	7607.887	8206.300	7972.162	7786.741
1232	1233	1234	1235	1236	1237	1238
8225.894	8773.966	8063.609	8044.662	8307.829	7087.598	6818.389
1239	1240	1241	1242	1244	1245	1246
7877.860	7205.924	7268.424	8827.475	8249.289	8433.529	8162.940
1247	1248	1249	1250	1251	1252	1254
7542.917	8129.163	8515.949	7635.995	7264.102	8378.252	7016.385
1255	1256	1257	1258	1259	1260	1261
7633.467	8090.613	7407.726	7737.340	7430.823	8889.610	8240.484

1262	1263	1264	1265	1266	1267	1268
7491.291	8464.716	7692.265	8195.218	7690.922	8361.712	8719.997
1269	1270	1271	1272	1273	1274	1275
8221.925	8221.925	8174.907	7925.606	9229.846	7273.481	7967.980
1276	1277	1278	1279	1280	1281	1282
7460.150	8007.287	8078.867	8445.821	7552.952	7088.872	8492.886
1283	1284	1285	1286	1287	1288	1289
7950.745	8422.121	9079.256	7810.876	8106.862	8184.763	9046.385
1290	1291	1292	1293	1294	1295	1296
8186.857	7742.091	7832.359	7367.755	8333.345	7973.903	7531.516
1297	1298	1299	1304	1312	1313	1314
7613.687	7159.353	7725.684	7698.435	8239.912	8226.585	8208.709
1317	1318	1320	1322	1324	1325	1330
7686.144	7939.467	9173.059	7695.062	8084.607	8233.563	7254.663
1333	1334	1335	1337	1341	1342	1344
7973.792	8382.367	9079.944	7761.028	7971.200	8152.207	8199.977
1345	1347	1348	1349	1351	1352	1353
8788.666	8138.176	8782.497	7957.290	8137.718	8695.600	9059.507
1354	1356	1357	1358	1359	1360	1361
8086.216	8885.589	8012.360	8121.613	8270.047	8269.900	8461.426
1362	1363	1364	1365	1367	1368	1369
8710.454	8974.635	8903.005	7908.783	8187.600	7835.909	8541.086
1370	1371	1372	1373	1374	1375	1377
7263.845	8449.273	8302.130	8165.025	8751.676	8542.651	8503.838
1378	1379	1381	1382	1383	1384	1385
8507.947	7398.047	8374.963	7644.707	8984.579	8706.043	8148.072
1386	1387	1388	1389	1390	1392	1393
7800.388	9483.707	8434.609	8509.267	9013.272	8479.478	7888.311
1394	1395	1396	1397	1398	1399	1400
9080.021	7879.192	8035.726	8308.988	8393.218	8923.399	8459.715
1401	1402	1403	1404	1405	1407	1408
9443.689	9372.575	8069.091	8160.967	8242.236	9017.426	9635.603
1409	1410	1411	1412	1413	1414	1415
7931.338	8964.597	7736.341	8858.326	9159.194	9191.463	7967.152
1417	1418	1420	1421	1422	1423	1424
8518.767	8296.164	8564.822	8873.892	8026.112	8283.775	7341.773
1425	1426	1428	1429	1430	1431	1432
8394.532	7670.452	8901.910	8642.046	8691.957	7815.607	9122.408
1433	1434	1435	1436			
8753.074	8893.796	9004.635	9482.431			

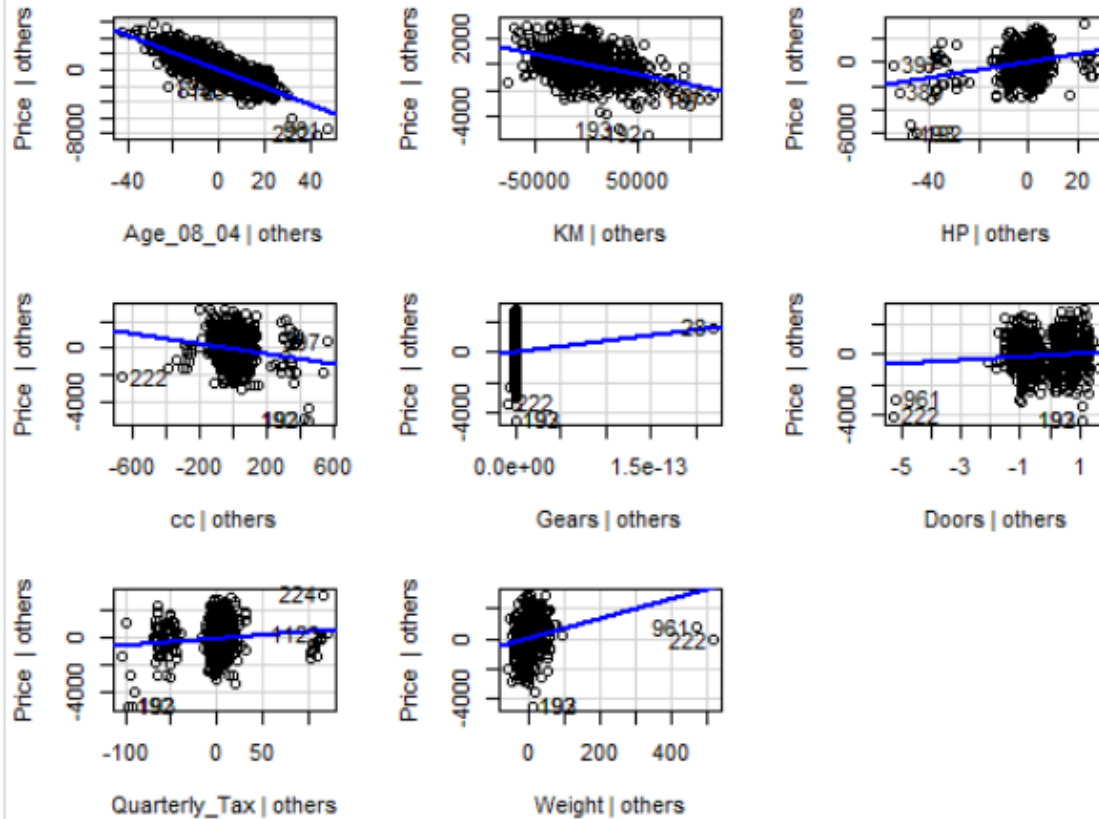
```
> vif(toyota_model1)
```

Age_08_04	KM	HP	Gears	CC
1.884620	1.756905	1.419422	1.098723	1.163894
Doors	Quarterly_Tax	Weight		
1.156575	2.311431	2.516420		

```
> library(vcov)
```

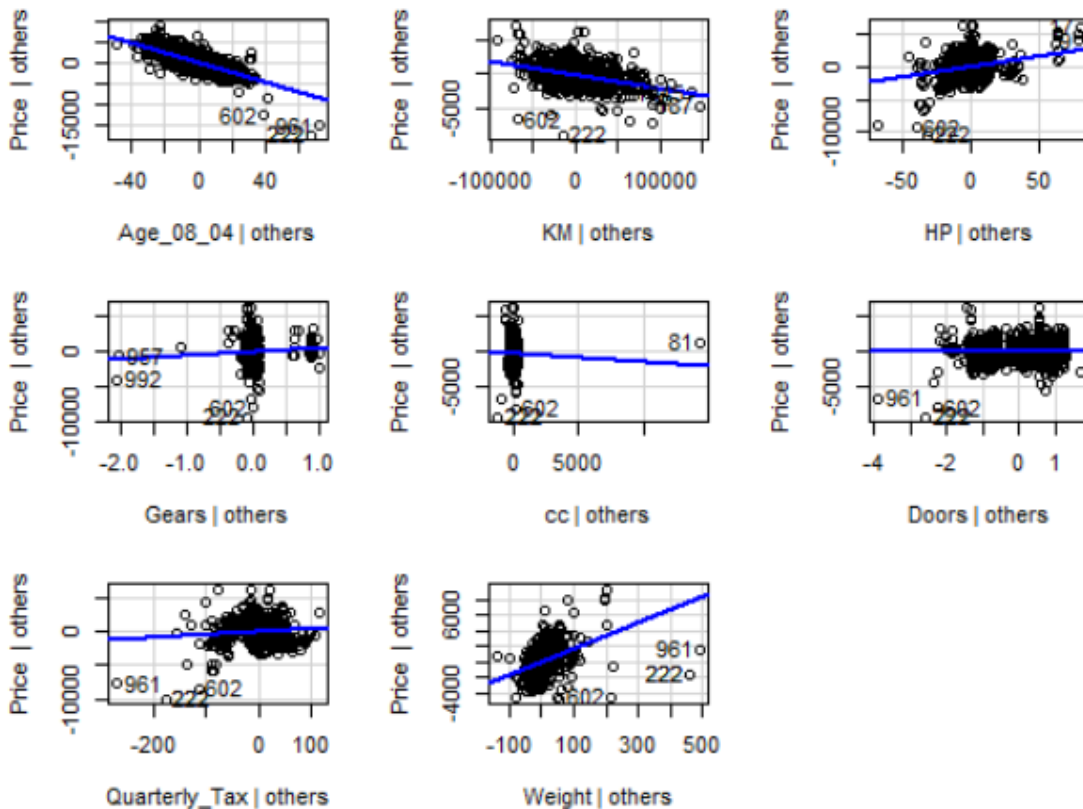
```
> avPlots(toyota_model2)
```

Added-Variable Plots



> avPlots(toyota_model1)

Added-Variable Plots



```
> toyota_model3 <- lm(Price~Age_08_04+KM+HP+cc+Gears+Quarterly_Tax+Weight,dat
a = toyota[-c(81),])
> summary(toyota_model3)
```

Call:

```
lm(formula = Price ~ Age_08_04 + KM + HP + cc + Gears + Quarterly_Tax +
    weight, data = toyota[-c(81), ])
```

Residuals:

```
      Min       1Q   Median       3Q      Max
-4417.6  -674.0   -19.2   624.4  3065.3
```

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	8137.15269	1086.46325	7.490	1.55e-13	***
Age_08_04	-109.33084	2.60529	-41.965	< 2e-16	***
KM	-0.01578	0.00124	-12.721	< 2e-16	***
HP	36.02651	4.07362	8.844	< 2e-16	***
cc	-2.10101	0.36711	-5.723	1.39e-08	***
Gears	NA	NA	NA	NA	
Quarterly_Tax	5.89842	1.55141	3.802	0.000153	***
Weight	7.95569	1.10526	7.198	1.22e-12	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1040 on 970 degrees of freedom

Multiple R-squared: 0.7968, Adjusted R-squared: 0.7955

F-statistic: 633.8 on 6 and 970 DF, p-value: < 2.2e-16

```
> Confint(toyota_model3,level = 0.95)
```

	Estimate	2.5 %	97.5 %
(Intercept)	8137.15268779	6005.06348947	1.026924e+04
Age_08_04	-109.33084476	-114.44349532	-1.042182e+02
KM	-0.01577861	-0.01821262	-1.334461e-02
HP	36.02650850	28.03238852	4.402063e+01
cc	-2.10100554	-2.82143540	-1.380576e+00
Gears	NA	NA	NA
Quarterly_Tax	5.89842332	2.85391328	8.942933e+00
Weight	7.95568841	5.78670977	1.012467e+01

```
> predict(toyota_model3,interval = "predict")
```

	fit	lwr	upr
28	14326.131	12278.115	16374.147
31	14229.208	12171.925	16286.490
32	14982.269	12931.314	17033.225
33	14525.380	12475.894	16574.866
34	14584.503	12534.775	16634.231
35	14890.738	12839.627	16941.848
36	14421.857	12371.976	16471.738
37	14815.203	12765.131	16865.275
38	15270.544	13219.386	17321.702
40	14557.095	12507.578	16606.611
41	14763.578	12712.091	16815.064
42	14295.675	12246.058	16345.291
43	14796.681	12745.311	16848.052
48	14433.064	12378.260	16487.869
52	13841.833	11791.579	15892.087
55	15087.684	13033.098	17142.270
56	13572.127	11526.092	15618.161
57	14279.439	12229.229	16329.649
58	14501.414	12450.658	16552.170
60	14335.251	12286.562	16383.940
62	14691.219	12641.851	16740.588
66	14052.521	11995.661	16109.382
68	15137.548	13085.824	17189.272
70	14820.301	12769.429	16871.173
71	14500.403	12450.258	16550.547
72	13665.421	11618.520	15712.322
74	15062.504	13011.075	17113.933

76	15154.008	13104.661	17203.354
79	14583.622	12535.523	16631.720
80	14395.442	12345.492	16445.391
83	15020.941	12969.763	17072.120
85	15046.014	12994.764	17097.263
97	15401.210	13349.313	17453.107
102	15562.704	13510.758	17614.650
123	15948.484	13895.768	18001.200
125	15802.910	13750.527	17855.292
127	14648.248	12588.798	16707.698
128	15283.628	13231.194	17336.062
130	15453.373	13390.578	17516.168
131	15321.071	13268.684	17373.457
132	15365.724	13313.373	17418.075
133	15480.672	13427.991	17533.354
134	15756.831	13693.395	17820.267
135	15378.300	13325.954	17430.645
136	15506.234	13453.565	17558.902
138	15823.117	13759.844	17886.390
141	15479.472	13427.107	17531.838
146	15955.974	13902.265	18009.683
156	15976.042	13923.265	18028.820
187	8017.664	5917.776	10117.553
191	9599.725	7516.869	11682.580
192	8740.858	6647.667	10834.049
193	9167.622	7077.963	11257.281
194	10366.333	8285.880	12446.786
195	10361.724	8281.423	12442.026
196	11881.649	9829.693	13933.606
197	9887.554	7806.247	11968.861
199	10992.209	8941.820	13042.597
200	12979.672	10905.754	15053.589
201	11453.806	9407.656	13499.956
202	11355.734	9306.072	13405.396
203	11745.444	9699.307	13791.581
204	11283.465	9201.335	13365.596
205	10670.968	8589.009	12752.926
206	11232.347	9185.497	13279.198
207	12071.637	10025.676	14117.598
209	12019.078	9973.515	14064.641
210	13467.965	11394.773	15541.157
213	13072.199	11024.592	15119.806
216	12964.255	10916.898	15011.612
219	11260.365	9214.495	13306.235
220	12464.968	10419.413	14510.523
222	16567.451	14224.493	18910.409
223	12270.658	10225.700	14315.615
224	12445.818	10371.781	14519.855
225	12842.174	10795.981	14888.366
226	12567.750	10522.611	14612.889
227	12551.588	10503.527	14599.649
228	12876.410	10829.268	14923.551
229	12221.343	10177.267	14265.420
231	11440.162	9394.993	13485.331
232	12816.703	10760.925	14872.481
233	11732.542	9687.275	13777.809
234	12010.930	9965.297	14056.562
243	11838.389	9793.304	13883.473
247	12023.931	9978.982	14068.880
250	12326.160	10282.255	14370.066
251	13310.927	11264.979	15356.874
252	11777.071	9730.771	13823.372
253	12242.501	10198.762	14286.240
255	12292.564	10239.191	14345.937
256	12358.506	10314.610	14402.403
258	11619.518	9574.673	13664.362
259	11620.843	9576.000	13665.686
260	13364.653	11318.798	15410.507

262	12725.582	10681.152	14770.013
263	12054.808	10008.065	14101.552
264	12619.928	10575.686	14664.170
266	12856.577	10811.950	14901.205
267	12243.022	10199.393	14286.650
268	12924.375	10876.682	14972.067
271	12133.381	10045.302	14221.461
272	12877.137	10832.509	14921.765
273	11928.542	9840.261	14016.822
274	12865.014	10816.326	14913.702
275	12333.591	10289.803	14377.379
276	12562.509	10518.415	14606.603
277	12622.039	10576.864	14667.213
278	12418.697	10372.416	14464.979
279	11816.720	9771.701	13861.739
280	12747.529	10702.138	14792.920
281	13067.519	11021.464	15113.574
282	12734.718	10690.471	14778.965
283	12449.118	10395.926	14502.309
284	12938.123	10893.170	14983.076
285	12595.060	10550.933	14639.187
286	12816.972	10772.508	14861.436
287	12711.602	10667.306	14755.897
288	12500.443	10453.996	14546.891
289	12116.456	10072.068	14160.844
290	12402.512	10358.622	14446.402
291	12798.239	10751.177	14845.301
292	12845.800	10801.305	14890.294
293	12993.864	10947.300	15040.428
294	13508.585	11462.816	15554.355
295	12568.536	10524.505	14612.567
296	12605.975	10559.411	14652.538
297	13210.220	11136.603	15283.837
300	12738.030	10692.726	14783.333
301	13119.639	11074.705	15164.574
302	12350.817	10305.247	14396.387
303	12306.229	10261.568	14350.889
304	12368.553	10322.603	14414.503
305	12190.647	10146.144	14235.151
306	12519.855	10474.955	14564.754
307	11825.965	9781.031	13870.899
308	12213.178	10167.396	14258.961
310	12590.215	10546.026	14634.404
311	12848.845	10804.417	14893.272
312	12414.551	10370.580	14458.522
320	12008.529	9956.388	14060.670
321	12961.332	10916.717	15005.947
324	12039.738	9994.172	14085.304
327	12129.468	10084.019	14174.918
329	13440.846	11395.326	15486.366
330	12568.487	10524.126	14612.848
332	13485.626	11440.159	15531.094
335	13395.747	11349.386	15442.108
336	13087.872	11040.335	15135.408
337	13305.840	11251.248	15360.432
338	12487.617	10441.693	14533.541
342	12472.978	10428.409	14517.547
343	12573.503	10528.167	14618.840
345	13731.190	11685.077	15777.303
347	12598.620	10551.993	14645.247
348	13193.451	11148.193	15238.708
349	12287.369	10241.147	14333.590
350	13754.463	11708.281	15800.646
352	12604.569	10559.275	14649.864
354	13059.896	11014.028	15105.764
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356	13172.623	11127.334	15217.911
357	13018.858	10973.040	15064.676

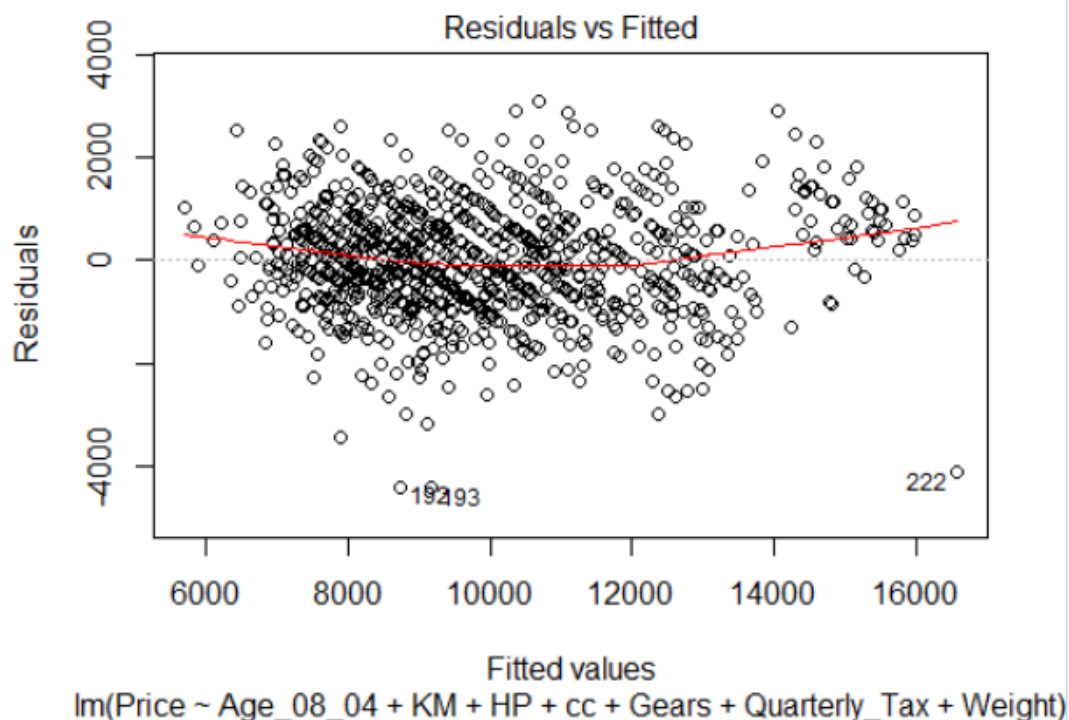
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359	12743.331	10698.364	14788.297
360	12471.064	10423.416	14518.712
362	13046.448	10999.135	15093.761
363	12390.637	10344.549	14436.724
364	13046.329	11001.006	15091.652
365	13276.841	11231.224	15322.458
366	12303.252	10255.687	14350.818
367	13079.694	11032.282	15127.106
368	12427.701	10381.462	14473.939
369	12955.329	10906.715	15003.943
370	12689.635	10644.400	14734.870
371	12784.003	10735.544	14832.462
372	13681.596	11635.171	15728.021
374	13565.854	11511.303	15620.405
375	13201.150	11155.207	15247.092
376	13217.682	11171.132	15264.233
377	13338.944	11292.427	15385.462
378	12765.699	10718.972	14812.427
379	7350.378	5261.063	9439.694
380	7731.085	5644.484	9817.686
381	7941.745	5859.232	10024.257
383	8768.392	6684.437	10852.346
384	9335.523	7281.939	11389.106
387	8732.793	6652.369	10813.218
388	11312.370	9234.062	13390.677
389	8371.453	6269.733	10473.173
390	8346.227	6265.645	10426.810
392	8972.377	6892.115	11052.639
393	10362.238	8311.786	12412.690
394	7889.071	5801.075	9977.067
395	10176.694	8127.139	12226.249
396	10694.726	8646.198	12743.254
397	8184.346	6084.231	10284.462
399	9517.533	7469.287	11565.779
400	9652.378	7604.138	11700.617
401	9641.030	7592.599	11689.461
404	10565.635	8517.871	12613.399
406	10255.965	8211.090	12300.839
408	11078.447	9032.332	13124.561
409	10548.278	8501.570	12594.986
410	10328.910	8284.205	12373.614
411	10337.315	8290.224	12384.406
412	10380.694	8335.574	12425.814
413	9996.002	7914.426	12077.577
414	10709.161	8664.350	12753.972
415	10561.941	8515.566	12608.317
416	10284.555	8240.387	12328.723
420	9487.829	7440.733	11534.925
421	10834.647	8789.723	12879.571
422	10034.122	7989.013	12079.232
423	9575.624	7492.474	11658.774
424	10971.762	8926.160	13017.363
425	10702.690	8658.900	12746.480
426	11122.416	9075.755	13169.078
427	10741.486	8696.256	12786.717
428	10164.190	8111.953	12216.428
429	11007.077	8963.394	13050.760
430	11014.351	8970.699	13058.004
431	10646.277	8601.200	12691.353
432	10519.681	8474.877	12564.484
434	11127.863	9084.207	13171.518
435	10670.746	8625.947	12715.545
436	10738.523	8695.420	12781.626
437	12421.197	10348.938	14493.455
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439	10178.910	8134.942	12222.878
440	10757.421	8711.654	12803.188

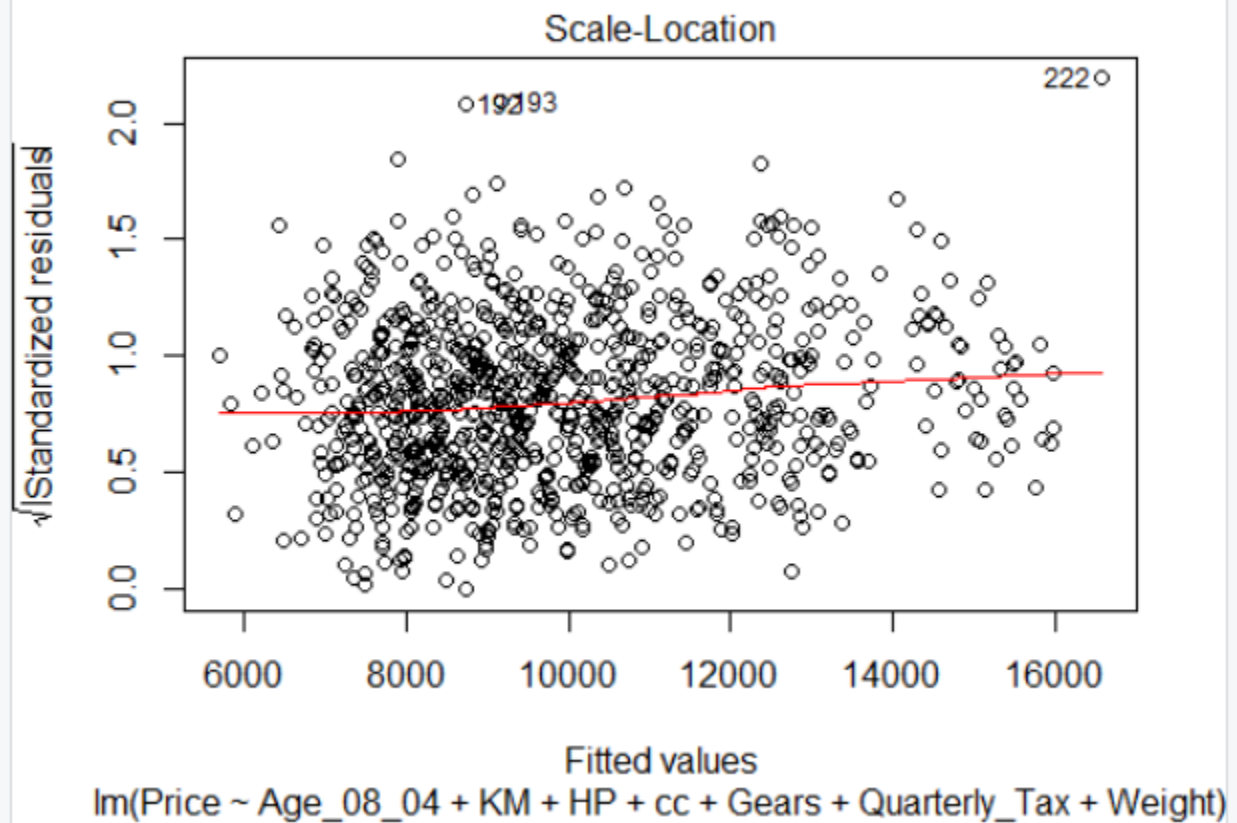
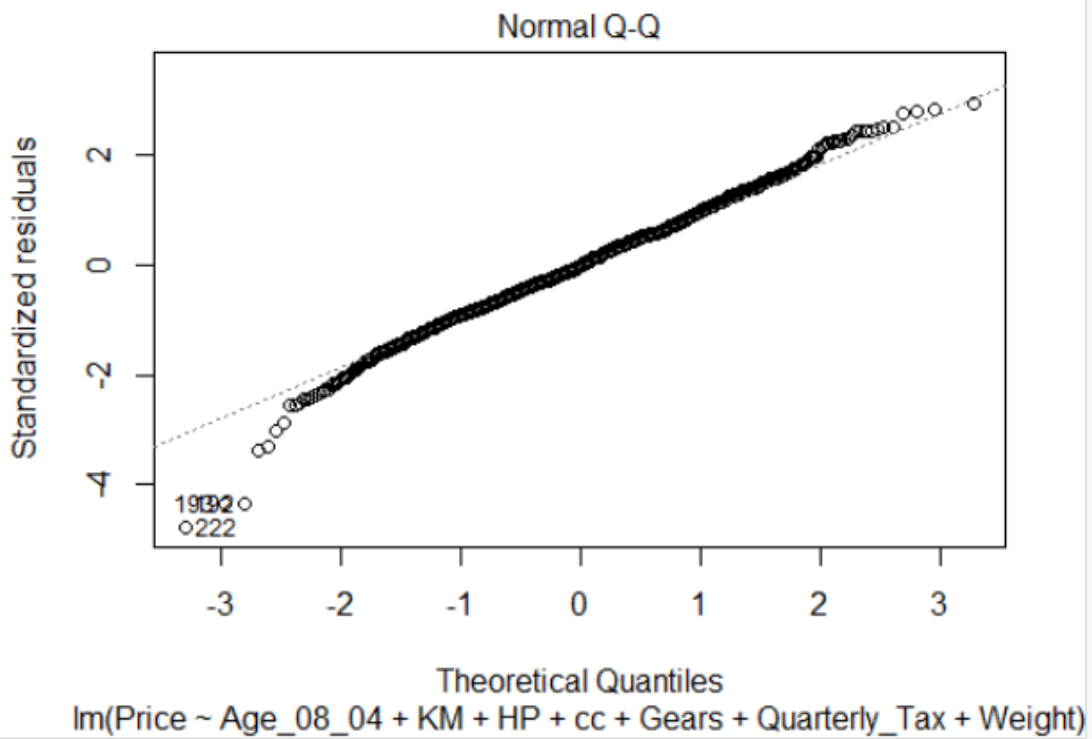
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447	10639.874	8597.049	12682.698
448	9978.136	7893.482	12062.790
449	9953.854	7910.321	11997.387
450	11259.567	9216.242	13302.893
451	11191.119	9147.896	13234.342
452	11495.444	9451.877	13539.010
453	10779.855	8735.535	12824.175
454	10796.034	8752.708	12839.360
455	11145.992	9102.852	13189.131
456	10321.293	8277.475	12365.111
457	10344.002	8299.772	12388.231
459	9935.328	7849.822	12020.833
460	10516.558	8472.597	12560.519
463	11537.490	9492.911	13582.070
464	10564.490	8479.251	12649.730
465	10900.738	8855.389	12946.087
467	11143.191	9098.242	13188.141
468	10735.350	8692.358	12778.343
469	11097.061	9054.219	13139.904
470	10965.278	8922.257	13008.299
472	10097.439	8054.182	12140.697
473	10538.392	8494.677	12582.107
474	10254.758	8203.909	12305.606
475	11158.610	9114.034	13203.186
476	10338.191	8294.756	12381.626
479	10598.875	8555.669	12642.082
481	10549.831	8463.331	12636.331
482	10372.339	8328.341	12416.338
483	10934.256	8891.524	12976.988
484	10386.273	8343.209	12429.337
485	10361.559	8318.149	12404.970
486	11175.478	9131.764	13219.191
487	11352.550	9309.630	13395.470
489	10413.901	8370.827	12456.975
490	10891.509	8838.125	12944.894
491	11249.053	9203.518	13294.587
492	10937.837	8895.140	12980.534
493	10745.077	8701.347	12788.806
494	11331.772	9284.570	13378.975
495	10548.808	8504.699	12592.918
496	10849.378	8805.736	12893.019
497	10964.803	8922.081	13007.525
498	10564.619	8521.461	12607.777
499	10792.042	8749.265	12834.818
500	10543.014	8499.538	12586.491
501	11346.538	9303.636	13389.440
502	11595.746	9541.836	13649.655
503	10717.956	8674.099	12761.813
504	10550.623	8507.206	12594.040
505	11109.755	9065.599	13153.910
506	11006.664	8963.886	13049.442
507	10709.341	8665.097	12753.585
508	10745.270	8701.841	12788.698
509	11466.266	9423.294	13509.239
510	11748.182	9704.110	13792.253
511	11094.390	9050.845	13137.935
512	11413.392	9370.416	13456.368
513	11415.601	9372.622	13458.580
514	11056.580	9012.609	13100.551
515	10301.804	8258.525	12345.083
516	10598.273	8547.042	12649.504
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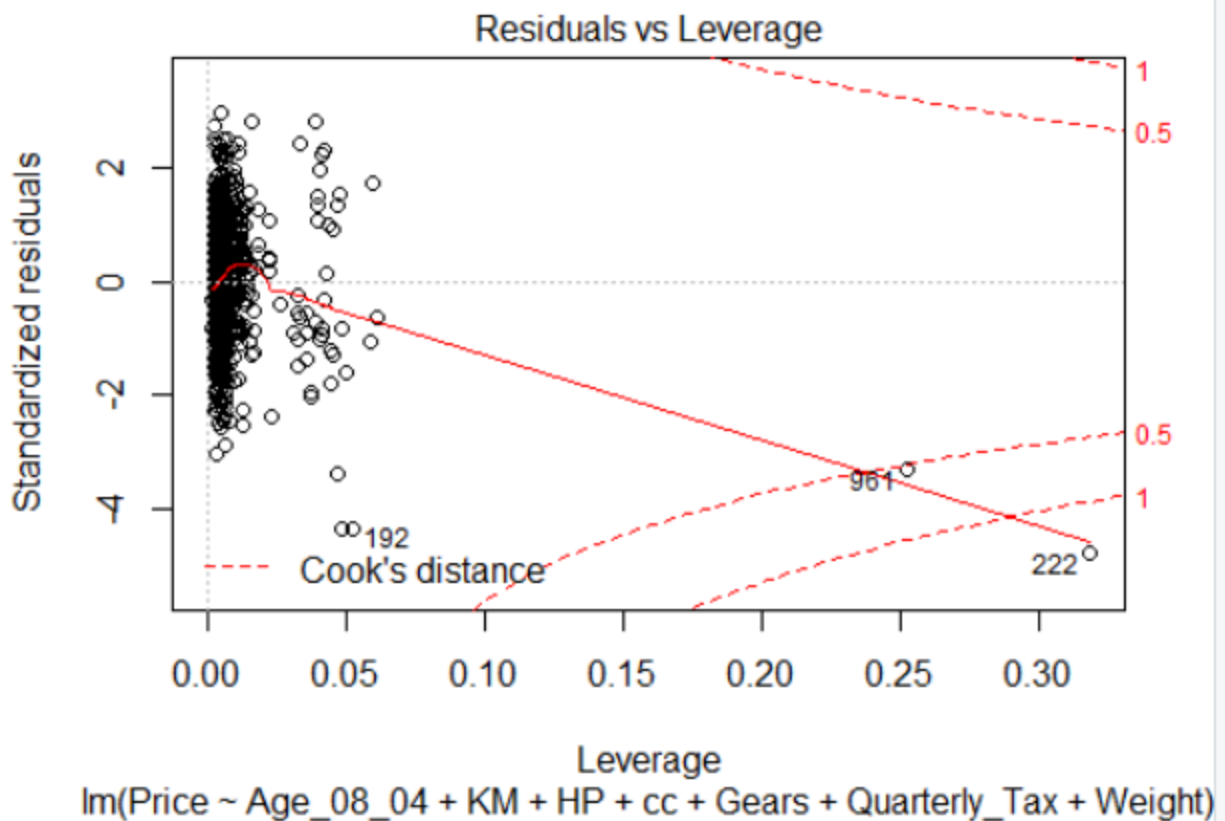
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539 10289.021 8243.853 12334.189
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541 11921.655 9878.261 13965.050
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554 11506.939 9462.959 13550.919
555 11790.644 9747.127 13834.161
556 11520.714 9476.695 13564.733
558 10684.673 8639.089 12730.256
559 12062.275 10018.600 14105.950
560 11738.921 9695.340 13782.503
562 10732.657 8688.782 12776.531
564 11451.258 9407.209 13495.306
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573 10573.480 8529.420 12617.541
574 11830.704 9786.294 13875.115
[ reached getOption("max.print") -- omitted 644 rows ]
> plot(toyota_model3)
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:

```







```
> toyota_model4 <- lm(Price~log(Age_08_04)+log(KM)+log(HP)+log(cc)+log(Gears)+log(Quarterly_Tax)+log(weight),data = toyota[-c(81),])
> summary(toyota_model4)
```

Call:

```
lm(formula = Price ~ log(Age_08_04) + log(KM) + log(HP) + log(cc) + log(Gears) + log(Quarterly_Tax) + log(weight), data = toyota[-c(81),])
```

Residuals:

Min	1Q	Median	3Q	Max
-6604.9	-663.1	-31.9	690.8	3614.6

Coefficients: (1 not defined because of singularities)

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-8675.56	8423.24	-1.030	0.303
log(Age_08_04)	-5643.02	129.67	-43.519	< 2e-16 ***
log(KM)	-485.97	63.94	-7.600	6.97e-14 ***
log(HP)	3698.84	368.73	10.031	< 2e-16 ***
log(cc)	-2910.24	537.67	-5.413	7.83e-08 ***
log(Gears)	NA	NA	NA	NA
log(Quarterly_Tax)	436.15	96.08	4.539	6.35e-06 ***
log(weight)	7051.23	1362.25	5.176	2.75e-07 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1096 on 970 degrees of freedom
Multiple R-squared: 0.7742, Adjusted R-squared: 0.7728
F-statistic: 554.2 on 6 and 970 DF, p-value: < 2.2e-16

```
> Confint(toyota_model4,level = 0.95)
```

	Estimate	2.5 %	97.5 %
(Intercept)	-8675.5558	-25205.4312	7854.3197
log(Age_08_04)	-5643.0228	-5897.4848	-5388.5609
log(KM)	-485.9686	-611.4526	-360.4846

```
log(HP)          3698.8396   2975.2347   4422.4444
log(cc)         -2910.2373  -3965.3716 -1855.1030
log(Gears)              NA              NA              NA
log(Quarterly_Tax)  436.1479   247.6007   624.6952
log(weight)        7051.2287  4377.9315  9724.5260
```

```
> predict(toyota_model4,interval = "predict")
```

	fit	lwr	upr
28	14516.407	12356.806	16676.008
31	14362.213	12183.779	16540.646
32	15950.697	13785.335	18116.058
33	14880.708	12719.002	17042.414
34	15043.913	12881.670	17206.157
35	15876.560	13710.840	18042.280
36	14910.724	12748.119	17073.329
37	15395.600	13232.609	17558.591
38	16311.413	14143.138	18479.688
40	14914.990	12753.221	17076.758
41	15789.352	13622.994	17955.710
42	14685.832	12523.795	16847.869
43	15810.592	13644.411	17976.773
48	15646.577	13476.946	17816.209
52	14029.312	11867.012	16191.612
55	15619.249	13451.221	17787.277
56	13623.639	11466.413	15780.864
57	14553.976	12391.506	16716.446
58	14974.537	12810.962	17138.111
60	14417.599	12257.496	16577.702
62	15034.791	12873.419	17196.164
66	14312.616	12136.069	16489.163
68	16085.740	13919.751	18251.729
70	15375.383	13211.602	17539.165
71	14744.329	12582.069	16906.589
72	13665.942	11508.009	15823.876
74	15870.939	13705.790	18036.088
76	15983.146	13820.293	18146.000
79	14779.744	12619.719	16939.768
80	14492.691	12330.517	16654.865
83	15646.747	13481.758	17811.735
85	15694.427	13528.992	17859.862
97	16864.891	14696.498	19033.284
102	17072.533	14904.036	19241.029
123	18611.097	16434.338	20787.856
125	17660.859	15490.069	19831.648
127	15738.645	13555.164	17922.127
128	16555.102	14386.898	18723.306
130	18204.874	16006.366	20403.382
131	16589.221	14421.161	18757.281
132	16633.314	14465.387	18801.241
133	16928.604	14759.531	19097.677
134	18462.546	16266.324	20658.768
135	16646.489	14478.590	18814.388
136	16956.109	14787.100	19125.117
138	18537.558	16341.943	20733.173
141	16767.922	14600.030	18935.813
146	18083.717	15910.542	20256.892
156	18493.340	16318.324	20668.356
187	9484.501	7290.442	11678.561
191	10060.827	7867.640	12254.014
192	9257.370	7066.667	11448.074
193	9348.411	7158.325	11538.497
194	10384.407	8191.770	12577.045
195	10270.520	8078.045	12462.995
196	12342.763	10183.898	14501.627
197	9644.004	7451.348	11836.660
199	11178.508	9020.077	13336.938
200	12782.238	10616.923	14947.554
201	11461.974	9306.454	13617.494

202	11497.990	9339.352	13656.627
203	11748.272	9592.517	13904.027
204	11121.019	8927.528	13314.511
205	10155.407	7962.909	12347.906
206	11208.297	9051.708	13364.887
207	12060.912	9904.962	14216.862
209	11960.460	9804.847	14116.072
210	13178.203	11013.015	15343.391
213	13211.877	11053.595	15370.160
216	13194.704	11036.482	15352.927
219	11083.732	8927.606	13239.859
220	12417.838	10261.824	14573.853
222	14745.440	12332.000	17158.880
223	12140.452	9985.082	14295.821
224	11921.291	9759.469	14083.112
225	12902.745	10745.786	15059.704
226	12462.417	10306.699	14618.134
227	12615.337	10455.969	14774.704
228	12932.349	10774.431	15090.268
229	11954.166	9799.584	14108.748
231	11163.997	9008.346	13319.648
232	12648.579	10474.734	14822.424
233	11477.583	9321.881	13633.286
234	11792.900	9636.643	13949.157
243	11547.917	9392.270	13703.564
247	11734.004	9578.594	13889.414
250	11995.836	9841.470	14150.203
251	13357.158	11200.082	15514.234
252	11477.642	9320.308	13634.976
253	11877.539	9723.363	14031.715
255	11776.240	9605.425	13947.055
256	12014.160	9859.821	14168.499
258	11259.932	9104.588	13415.277
259	11260.717	9105.373	13416.060
260	13388.013	11231.062	15544.963
262	12455.457	10300.526	14610.388
263	11780.929	9623.073	13938.786
264	12314.819	10160.117	14469.520
266	12615.333	10460.167	14770.499
267	11822.419	9668.380	13976.458
268	12920.686	10761.497	15079.875
271	11725.201	9529.309	13921.093
272	12628.297	10473.145	14783.449
273	11401.942	9206.380	13597.504
274	12865.344	10704.714	15025.975
275	11932.731	9778.566	14086.896
276	12208.123	10053.631	14362.614
277	12320.118	10164.579	14475.656
278	12172.761	10015.631	14329.891
279	11444.617	9289.104	13600.131
280	12515.106	10359.024	14671.188
281	12936.165	10779.484	15092.847
282	12395.447	10240.786	14550.107
283	11842.686	9672.339	14013.032
284	12559.847	10404.283	14715.412
285	12229.771	10075.265	14384.277
286	12514.197	10359.291	14669.102
287	12374.041	10219.344	14528.738
288	12311.386	10154.101	14468.672
289	11667.208	9512.527	13821.890
290	11979.097	9824.869	14133.325
291	12659.693	10501.493	14817.893
292	12534.302	10379.381	14689.222
293	12890.940	10733.455	15048.426
294	13481.858	11325.109	15638.607
295	12156.689	10002.305	14311.074
296	12373.682	10216.209	14531.156

297	12421.638	10259.079	14584.198
300	12439.888	10284.005	14595.771
301	12872.340	10716.887	15027.794
302	12003.727	9847.604	14159.851
303	11893.183	9738.106	14048.260
304	12078.902	9922.300	14235.504
305	11721.844	9567.058	13876.630
306	12121.288	9966.109	14276.468
307	11400.521	9245.112	13555.930
308	11842.916	9686.468	13999.365
310	12170.612	10016.085	14325.140
311	12478.808	10324.001	14633.614
312	11943.390	9789.067	14097.713
320	11276.047	9106.727	13445.368
321	12570.770	10415.721	14725.820
324	11617.563	9461.352	13773.774
327	11735.129	9579.080	13891.178
329	13272.663	11116.420	15428.906
330	12113.159	9958.373	14267.944
332	13310.038	11153.871	15466.205
335	13272.803	11115.742	15429.863
336	12967.050	10808.171	15125.930
337	12985.427	10813.093	15157.760
338	12123.609	9966.948	14280.269
342	12003.157	9848.009	14158.304
343	12167.366	10011.337	14323.396
345	13676.078	11518.881	15833.276
347	12272.179	10114.470	14429.888
348	12889.626	10733.638	15045.614
349	11882.600	9725.302	14039.899
350	13701.705	11544.361	15859.049
352	12166.917	10010.970	14322.863
354	12752.562	10595.941	14909.182
355	11954.795	9797.650	14111.941
356	12832.233	10675.984	14988.482
357	12707.049	10550.112	14863.986
358	13617.837	11458.930	15776.743
359	12291.228	10135.213	14447.243
360	12136.340	9976.901	14295.779
362	12927.598	10768.700	15086.497
363	12034.959	9877.615	14192.303
364	12685.524	10529.065	14841.983
365	12990.678	10833.801	15147.556
366	11899.238	9740.431	14058.044
367	12972.231	10812.977	15131.485
368	12085.015	9927.177	14242.853
369	12778.601	10617.538	14939.665
370	12236.836	10079.943	14393.729
371	12554.564	10393.113	14716.015
372	13571.011	11412.264	15729.758
374	13280.235	11107.331	15453.139
375	12897.677	10738.884	15056.470
376	12988.503	10829.291	15147.716
377	13157.402	10995.809	15318.995
378	12519.354	10355.916	14682.792
379	8361.830	6169.379	10554.282
380	8524.835	6332.074	10717.596
381	8429.520	6237.532	10621.508
383	9294.336	7101.287	11487.386
384	9917.673	7761.257	12074.089
387	8748.564	6556.064	10941.064
388	11433.918	9267.815	13600.021
389	8666.353	6468.725	10863.982
390	8376.754	6184.652	10568.857
392	8884.843	6692.422	11077.264
393	10706.379	8550.109	12862.649
394	7995.433	5805.968	10184.898

395	10479.789	8323.534	12636.044
396	10900.471	8744.530	13056.412
397	8193.043	5995.827	10390.260
399	9751.751	7595.202	11908.301
400	9862.049	7705.421	12018.677
401	9824.352	7668.163	11980.541
404	10626.511	8470.300	12782.723
406	10274.153	8119.670	12428.635
408	11095.535	8940.262	13250.808
409	10539.506	8383.710	12695.303
410	10316.849	8162.329	12471.369
411	10367.271	8210.625	12523.917
412	10374.504	8219.709	12529.299
413	9492.617	7300.169	11685.066
414	10655.541	8500.936	12810.146
415	10560.225	8404.426	12716.023
416	10233.462	8079.142	12387.781
420	9414.500	7257.301	11571.698
421	10750.550	8595.653	12905.448
422	9942.873	7787.828	12097.918
423	8974.801	6781.774	11167.828
424	10835.997	8680.558	12991.435
425	10560.256	8406.171	12714.341
426	11061.297	8904.607	13217.986
427	10620.467	8465.146	12775.789
428	9718.495	7548.857	11888.134
429	10812.189	8658.126	12966.253
430	10814.878	8660.830	12968.926
431	10492.289	8336.834	12647.745
432	10347.979	8193.107	12502.851
434	10912.580	8758.528	13066.632
435	10477.774	8322.848	12632.699
436	10505.792	8352.062	12659.523
437	11839.454	9675.685	14003.222
438	11072.328	8918.225	13226.431
439	9984.876	7830.210	12139.541
440	10569.414	8412.854	12725.975
441	10057.635	7902.414	12212.857
442	10681.574	8526.890	12836.257
443	10975.332	8818.831	13131.833
444	10461.685	8307.997	12615.373
447	10361.485	8207.827	12515.143
448	9289.100	7096.319	11481.882
449	9725.101	7570.941	11879.261
450	10982.046	8828.179	13135.914
451	10897.427	8743.639	13051.215
452	11224.376	9070.323	13378.429
453	10521.655	8367.006	12676.305
454	10524.143	8370.198	12678.087
455	10850.087	8696.374	13003.800
456	10052.392	7898.018	12206.766
457	10093.824	7938.732	12248.915
459	9203.345	7010.292	11396.399
460	10243.460	8088.772	12398.148
463	11229.279	9074.225	13384.332
464	9782.425	7589.034	11975.816
465	10629.871	8473.576	12786.165
467	10876.557	8721.183	13031.931
468	10379.380	8225.377	12533.384
469	10734.407	8580.827	12887.987
470	10589.828	8435.862	12743.793
472	9788.412	7634.462	11942.361
473	10208.317	8054.013	12362.620
474	9641.336	7472.659	11810.013
475	10846.374	8691.135	13001.612
476	10004.151	7850.073	12158.228
479	10257.274	8103.501	12411.047

481	9707.830	7513.948	11901.711
482	10053.311	7898.436	12208.187
483	10548.010	8394.509	12701.511
484	10055.015	7901.351	12208.680
485	10015.529	7861.477	12169.580
486	10779.393	8625.114	12933.673
487	10959.836	8806.313	13113.359
489	10068.769	7915.111	12222.426
490	10180.522	8009.638	12351.406
491	10927.067	8770.566	13083.567
492	10536.968	8383.590	12690.346
493	10366.229	8211.932	12520.525
494	10911.583	8753.413	13069.754
495	10190.839	8035.898	12345.780
496	10472.844	8318.620	12627.067
497	10550.954	8397.575	12704.334
498	10191.807	8038.107	12345.506
499	10381.684	8228.167	12535.200
500	10157.906	8003.828	12311.984
501	10913.625	8760.091	13067.159
502	10883.680	8712.603	13054.757
503	10340.922	8186.378	12495.467
504	10171.946	8017.930	12325.961
505	10727.873	8573.203	12882.542
506	10573.497	8420.103	12726.891
507	10323.933	8168.899	12478.968
508	10302.850	8148.773	12456.926
509	11020.228	8866.732	13173.724
510	11321.952	9167.478	13476.425
511	10631.363	8477.261	12785.466
512	10950.726	8797.176	13104.275
513	10952.001	8798.450	13105.552
514	10643.035	8488.555	12797.515
515	9895.665	7741.790	12049.540
516	9838.762	7669.659	12007.865
518	9899.834	7745.954	12053.713
519	11107.171	8952.890	13261.453
520	11090.644	8937.032	13244.255
521	10124.117	7970.111	12278.124
528	10130.319	7976.304	12284.334
530	10676.329	8522.680	12829.979
533	10517.274	8363.429	12671.119
537	10417.299	8263.725	12570.873
538	10483.388	8329.208	12637.568
539	9793.086	7637.292	11948.879
540	10517.939	8362.661	12673.217
541	11447.367	9293.595	13601.139
543	10488.207	8332.339	12644.074
544	10598.931	8444.539	12753.323
545	11103.374	8949.730	13257.018
547	10502.586	8348.748	12656.425
548	10076.800	7922.718	12230.883
549	9754.807	7598.829	11910.785
550	10895.023	8740.685	13049.361
552	10425.301	8270.954	12579.648
553	10805.401	8634.744	12976.058
554	10979.336	8824.961	13133.712
555	11274.188	9120.301	13428.076
556	10989.726	8835.311	13144.140
558	10135.351	7979.114	12291.589
559	11552.121	9398.067	13706.175
560	11206.542	9052.533	13360.550
562	10244.862	8090.476	12399.247
564	10945.868	8791.441	13100.296
565	10059.204	7904.757	12213.651
566	10270.445	8115.922	12424.968
568	11309.237	9154.349	13464.126

```

569 11000.115 8845.869 13154.361
570 11368.163 9213.874 13522.451
571 11783.117 9628.683 13937.551
573 10089.043 7934.403 12243.684
574 11331.099 9176.259 13485.938
[ reached getOption("max.print") -- omitted 644 rows ]

```

```

>
> toyota_model_quad <- lm(Price~Age_08_04+I(Age_08_04)+KM+I(KM)+HP+I(HP)+cc+I(cc)+Gears+I(Gears)+Quarterly_Tax+I(Quarterly_Tax)+Weight+I(Weight),data = toyota[-c(81),])
> summary(toyota_model_quad)

```

```

Call:
lm(formula = Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) + cc + I(cc) + Gears + I(Gears) + Quarterly_Tax + I(Quarterly_Tax) + Weight + I(Weight), data = toyota[-c(81),])

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-4417.6  -674.0   -19.2   624.4  3065.3

```

```

Coefficients: (8 not defined because of singularities)
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  8137.15269 1086.46325   7.490 1.55e-13 ***
Age_08_04    -109.33084   2.60529 -41.965 < 2e-16 ***
I(Age_08_04)          NA         NA      NA      NA
KM            -0.01578    0.00124 -12.721 < 2e-16 ***
I(KM)          NA         NA      NA      NA
HP            36.02651    4.07362   8.844 < 2e-16 ***
I(HP)          NA         NA      NA      NA
cc            -2.10101    0.36711  -5.723 1.39e-08 ***
I(cc)          NA         NA      NA      NA
Gears         NA         NA      NA      NA
I(Gears)       NA         NA      NA      NA
Quarterly_Tax  5.89842    1.55141   3.802 0.000153 ***
I(Quarterly_Tax) NA         NA      NA      NA
weight        7.95569    1.10526   7.198 1.22e-12 ***
I(weight)      NA         NA      NA      NA
---

```

```

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

Residual standard error: 1040 on 970 degrees of freedom
Multiple R-squared:  0.7968, Adjusted R-squared:  0.7955
F-statistic: 633.8 on 6 and 970 DF, p-value: < 2.2e-16

```

```

> Confint(toyota_model_quad,level = 0.95)

```

```

              Estimate      2.5 %      97.5 %
(Intercept)  8137.15268779 6005.06348947 1.026924e+04
Age_08_04    -109.33084476 -114.44349532 -1.042182e+02
I(Age_08_04)          NA         NA      NA
KM            -0.01577861  -0.01821262 -1.334461e-02
I(KM)          NA         NA      NA
HP            36.02650850  28.03238852  4.402063e+01
I(HP)          NA         NA      NA
cc            -2.10100554  -2.82143540 -1.380576e+00
I(cc)          NA         NA      NA
Gears         NA         NA      NA
I(Gears)       NA         NA      NA
Quarterly_Tax  5.89842332   2.85391328  8.942933e+00
I(Quarterly_Tax) NA         NA      NA
weight        7.95568841   5.78670977  1.012467e+01
I(weight)      NA         NA      NA

```

```

> predict(toyota_model_quad,interval = "predict")

```

```

      fit      lwr      upr
28 14326.131 12278.115 16374.147

```


31	14229.208	12171.925	16286.490
32	14982.269	12931.314	17033.225
33	14525.380	12475.894	16574.866
34	14584.503	12534.775	16634.231
35	14890.738	12839.627	16941.848
36	14421.857	12371.976	16471.738
37	14815.203	12765.131	16865.275
38	15270.544	13219.386	17321.702
40	14557.095	12507.578	16606.611
41	14763.578	12712.091	16815.064
42	14295.675	12246.058	16345.291
43	14796.681	12745.311	16848.052
48	14433.064	12378.260	16487.869
52	13841.833	11791.579	15892.087
55	15087.684	13033.098	17142.270
56	13572.127	11526.092	15618.161
57	14279.439	12229.229	16329.649
58	14501.414	12450.658	16552.170
60	14335.251	12286.562	16383.940
62	14691.219	12641.851	16740.588
66	14052.521	11995.661	16109.382
68	15137.548	13085.824	17189.272
70	14820.301	12769.429	16871.173
71	14500.403	12450.258	16550.547
72	13665.421	11618.520	15712.322
74	15062.504	13011.075	17113.933
76	15154.008	13104.661	17203.354
79	14583.622	12535.523	16631.720
80	14395.442	12345.492	16445.391
83	15020.941	12969.763	17072.120
85	15046.014	12994.764	17097.263
97	15401.210	13349.313	17453.107
102	15562.704	13510.758	17614.650
123	15948.484	13895.768	18001.200
125	15802.910	13750.527	17855.292
127	14648.248	12588.798	16707.698
128	15283.628	13231.194	17336.062
130	15453.373	13390.578	17516.168
131	15321.071	13268.684	17373.457
132	15365.724	13313.373	17418.075
133	15480.672	13427.991	17533.354
134	15756.831	13693.395	17820.267
135	15378.300	13325.954	17430.645
136	15506.234	13453.565	17558.902
138	15823.117	13759.844	17886.390
141	15479.472	13427.107	17531.838
146	15955.974	13902.265	18009.683
156	15976.042	13923.265	18028.820
187	8017.664	5917.776	10117.553
191	9599.725	7516.869	11682.580
192	8740.858	6647.667	10834.049
193	9167.622	7077.963	11257.281
194	10366.333	8285.880	12446.786
195	10361.724	8281.423	12442.026
196	11881.649	9829.693	13933.606
197	9887.554	7806.247	11968.861
199	10992.209	8941.820	13042.597
200	12979.672	10905.754	15053.589
201	11453.806	9407.656	13499.956
202	11355.734	9306.072	13405.396
203	11745.444	9699.307	13791.581
204	11283.465	9201.335	13365.596
205	10670.968	8589.009	12752.926
206	11232.347	9185.497	13279.198
207	12071.637	10025.676	14117.598
209	12019.078	9973.515	14064.641
210	13467.965	11394.773	15541.157

213	13072.199	11024.592	15119.806
216	12964.255	10916.898	15011.612
219	11260.365	9214.495	13306.235
220	12464.968	10419.413	14510.523
222	16567.451	14224.493	18910.409
223	12270.658	10225.700	14315.615
224	12445.818	10371.781	14519.855
225	12842.174	10795.981	14888.366
226	12567.750	10522.611	14612.889
227	12551.588	10503.527	14599.649
228	12876.410	10829.268	14923.551
229	12221.343	10177.267	14265.420
231	11440.162	9394.993	13485.331
232	12816.703	10760.925	14872.481
233	11732.542	9687.275	13777.809
234	12010.930	9965.297	14056.562
243	11838.389	9793.304	13883.473
247	12023.931	9978.982	14068.880
250	12326.160	10282.255	14370.066
251	13310.927	11264.979	15356.874
252	11777.071	9730.771	13823.372
253	12242.501	10198.762	14286.240
255	12292.564	10239.191	14345.937
256	12358.506	10314.610	14402.403
258	11619.518	9574.673	13664.362
259	11620.843	9576.000	13665.686
260	13364.653	11318.798	15410.507
262	12725.582	10681.152	14770.013
263	12054.808	10008.065	14101.552
264	12619.928	10575.686	14664.170
266	12856.577	10811.950	14901.205
267	12243.022	10199.393	14286.650
268	12924.375	10876.682	14972.067
271	12133.381	10045.302	14221.461
272	12877.137	10832.509	14921.765
273	11928.542	9840.261	14016.822
274	12865.014	10816.326	14913.702
275	12333.591	10289.803	14377.379
276	12562.509	10518.415	14606.603
277	12622.039	10576.864	14667.213
278	12418.697	10372.416	14464.979
279	11816.720	9771.701	13861.739
280	12747.529	10702.138	14792.920
281	13067.519	11021.464	15113.574
282	12734.718	10690.471	14778.965
283	12449.118	10395.926	14502.309
284	12938.123	10893.170	14983.076
285	12595.060	10550.933	14639.187
286	12816.972	10772.508	14861.436
287	12711.602	10667.306	14755.897
288	12500.443	10453.996	14546.891
289	12116.456	10072.068	14160.844
290	12402.512	10358.622	14446.402
291	12798.239	10751.177	14845.301
292	12845.800	10801.305	14890.294
293	12993.864	10947.300	15040.428
294	13508.585	11462.816	15554.355
295	12568.536	10524.505	14612.567
296	12605.975	10559.411	14652.538
297	13210.220	11136.603	15283.837
300	12738.030	10692.726	14783.333
301	13119.639	11074.705	15164.574
302	12350.817	10305.247	14396.387
303	12306.229	10261.568	14350.889
304	12368.553	10322.603	14414.503
305	12190.647	10146.144	14235.151
306	12519.855	10474.955	14564.754

307	11825.965	9781.031	13870.899
308	12213.178	10167.396	14258.961
310	12590.215	10546.026	14634.404
311	12848.845	10804.417	14893.272
312	12414.551	10370.580	14458.522
320	12008.529	9956.388	14060.670
321	12961.332	10916.717	15005.947
324	12039.738	9994.172	14085.304
327	12129.468	10084.019	14174.918
329	13440.846	11395.326	15486.366
330	12568.487	10524.126	14612.848
332	13485.626	11440.159	15531.094
335	13395.747	11349.386	15442.108
336	13087.872	11040.335	15135.408
337	13305.840	11251.248	15360.432
338	12487.617	10441.693	14533.541
342	12472.978	10428.409	14517.547
343	12573.503	10528.167	14618.840
345	13731.190	11685.077	15777.303
347	12598.620	10551.993	14645.247
348	13193.451	11148.193	15238.708
349	12287.369	10241.147	14333.590
350	13754.463	11708.281	15800.646
352	12604.569	10559.275	14649.864
354	13059.896	11014.028	15105.764
355	12359.856	10313.852	14405.860
356	13172.623	11127.334	15217.911
357	13018.858	10973.040	15064.676
358	13636.216	11589.011	15683.421
359	12743.331	10698.364	14788.297
360	12471.064	10423.416	14518.712
362	13046.448	10999.135	15093.761
363	12390.637	10344.549	14436.724
364	13046.329	11001.006	15091.652
365	13276.841	11231.224	15322.458
366	12303.252	10255.687	14350.818
367	13079.694	11032.282	15127.106
368	12427.701	10381.462	14473.939
369	12955.329	10906.715	15003.943
370	12689.635	10644.400	14734.870
371	12784.003	10735.544	14832.462
372	13681.596	11635.171	15728.021
374	13565.854	11511.303	15620.405
375	13201.150	11155.207	15247.092
376	13217.682	11171.132	15264.233
377	13338.944	11292.427	15385.462
378	12765.699	10718.972	14812.427
379	7350.378	5261.063	9439.694
380	7731.085	5644.484	9817.686
381	7941.745	5859.232	10024.257
383	8768.392	6684.437	10852.346
384	9335.523	7281.939	11389.106
387	8732.793	6652.369	10813.218
388	11312.370	9234.062	13390.677
389	8371.453	6269.733	10473.173
390	8346.227	6265.645	10426.810
392	8972.377	6892.115	11052.639
393	10362.238	8311.786	12412.690
394	7889.071	5801.075	9977.067
395	10176.694	8127.139	12226.249
396	10694.726	8646.198	12743.254
397	8184.346	6084.231	10284.462
399	9517.533	7469.287	11565.779
400	9652.378	7604.138	11700.617
401	9641.030	7592.599	11689.461
404	10565.635	8517.871	12613.399
406	10255.965	8211.090	12300.839

408	11078.447	9032.332	13124.561
409	10548.278	8501.570	12594.986
410	10328.910	8284.205	12373.614
411	10337.315	8290.224	12384.406
412	10380.694	8335.574	12425.814
413	9996.002	7914.426	12077.577
414	10709.161	8664.350	12753.972
415	10561.941	8515.566	12608.317
416	10284.555	8240.387	12328.723
420	9487.829	7440.733	11534.925
421	10834.647	8789.723	12879.571
422	10034.122	7989.013	12079.232
423	9575.624	7492.474	11658.774
424	10971.762	8926.160	13017.363
425	10702.690	8658.900	12746.480
426	11122.416	9075.755	13169.078
427	10741.486	8696.256	12786.717
428	10164.190	8111.953	12216.428
429	11007.077	8963.394	13050.760
430	11014.351	8970.699	13058.004
431	10646.277	8601.200	12691.353
432	10519.681	8474.877	12564.484
434	11127.863	9084.207	13171.518
435	10670.746	8625.947	12715.545
436	10738.523	8695.420	12781.626
437	12421.197	10348.938	14493.455
438	11304.111	9260.433	13347.789
439	10178.910	8134.942	12222.878
440	10757.421	8711.654	12803.188
441	10256.509	8212.080	12300.939
442	10956.360	8912.120	13000.600
443	11163.045	9117.193	13208.897
444	10741.063	8698.165	12783.961
447	10639.874	8597.049	12682.698
448	9978.136	7893.482	12062.790
449	9953.854	7910.321	11997.387
450	11259.567	9216.242	13302.893
451	11191.119	9147.896	13234.342
452	11495.444	9451.877	13539.010
453	10779.855	8735.535	12824.175
454	10796.034	8752.708	12839.360
455	11145.992	9102.852	13189.131
456	10321.293	8277.475	12365.111
457	10344.002	8299.772	12388.231
459	9935.328	7849.822	12020.833
460	10516.558	8472.597	12560.519
463	11537.490	9492.911	13582.070
464	10564.490	8479.251	12649.730
465	10900.738	8855.389	12946.087
467	11143.191	9098.242	13188.141
468	10735.350	8692.358	12778.343
469	11097.061	9054.219	13139.904
470	10965.278	8922.257	13008.299
472	10097.439	8054.182	12140.697
473	10538.392	8494.677	12582.107
474	10254.758	8203.909	12305.606
475	11158.610	9114.034	13203.186
476	10338.191	8294.756	12381.626
479	10598.875	8555.669	12642.082
481	10549.831	8463.331	12636.331
482	10372.339	8328.341	12416.338
483	10934.256	8891.524	12976.988
484	10386.273	8343.209	12429.337
485	10361.559	8318.149	12404.970
486	11175.478	9131.764	13219.191
487	11352.550	9309.630	13395.470
489	10413.901	8370.827	12456.975

490	10891.509	8838.125	12944.894
491	11249.053	9203.518	13294.587
492	10937.837	8895.140	12980.534
493	10745.077	8701.347	12788.806
494	11331.772	9284.570	13378.975
495	10548.808	8504.699	12592.918
496	10849.378	8805.736	12893.019
497	10964.803	8922.081	13007.525
498	10564.619	8521.461	12607.777
499	10792.042	8749.265	12834.818
500	10543.014	8499.538	12586.491
501	11346.538	9303.636	13389.440
502	11595.746	9541.836	13649.655
503	10717.956	8674.099	12761.813
504	10550.623	8507.206	12594.040
505	11109.755	9065.599	13153.910
506	11006.664	8963.886	13049.442
507	10709.341	8665.097	12753.585
508	10745.270	8701.841	12788.698
509	11466.266	9423.294	13509.239
510	11748.182	9704.110	13792.253
511	11094.390	9050.845	13137.935
512	11413.392	9370.416	13456.368
513	11415.601	9372.622	13458.580
514	11056.580	9012.609	13100.551
515	10301.804	8258.525	12345.083
516	10598.273	8547.042	12649.504
518	10308.873	8265.584	12352.161
519	11572.643	9528.784	13616.502
520	11570.185	9527.085	13613.285
521	10559.092	8515.634	12602.550
528	10569.095	8525.623	12612.568
530	11164.892	9121.789	13207.995
533	10975.499	8932.072	13018.925
537	10884.961	8841.830	12928.092
538	10981.524	8937.861	13025.186
539	10289.021	8243.853	12334.189
540	10961.484	8916.899	13006.068
541	11921.655	9878.261	13965.050
543	10928.332	8883.305	12973.359
544	11059.530	9015.612	13103.447
545	11601.410	9558.179	13644.642
547	10994.103	8950.783	13037.422
548	10535.960	8492.390	12579.529
549	10253.644	8208.238	12299.050
550	11363.412	9319.449	13407.376
552	10908.716	8864.851	12952.581
553	11627.396	9573.780	13681.011
554	11506.939	9462.959	13550.919
555	11790.644	9747.127	13834.161
556	11520.714	9476.695	13564.733
558	10684.673	8639.089	12730.256
559	12062.275	10018.600	14105.950
560	11738.921	9695.340	13782.503
562	10732.657	8688.782	12776.531
564	11451.258	9407.209	13495.306

[reached getOption("max.print") -- omitted 644 rows]

```
> library("MASS")
```

```
> stepAIC(toyota_model_quad)
```

Start: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +
cc + I(cc) + Gears + I(Gears) + Quarterly_Tax + I(Quarterly_Tax) +
weight + I(weight)

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +

cc + I(cc) + Gears + I(Gears) + Quarterly_Tax + I(Quarterly_Tax) +
weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +
cc + I(cc) + Gears + I(Gears) + Quarterly_Tax + Weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +
cc + I(cc) + Gears + Quarterly_Tax + Weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +
cc + I(cc) + Quarterly_Tax + Weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + I(HP) +
cc + Quarterly_Tax + Weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + I(KM) + HP + cc + Quarterly_Tax +
weight

Step: AIC=13581.29

Price ~ Age_08_04 + I(Age_08_04) + KM + HP + cc + Quarterly_Tax +
weight

Step: AIC=13581.29

Price ~ Age_08_04 + KM + HP + cc + Quarterly_Tax + Weight

	Df	Sum of Sq	RSS	AIC
<none>			1049073409	13581
- Quarterly_Tax	1	15633343	1064706753	13594
- cc	1	35423037	1084496447	13612
- weight	1	56035053	1105108462	13630
- HP	1	84589767	1133663177	13655
- KM	1	175028667	1224102077	13730
- Age_08_04	1	1904618465	2953691875	14591

Call:

lm(formula = Price ~ Age_08_04 + KM + HP + cc + Quarterly_Tax +
weight, data = toyota[-c(81),])

Coefficients:

(Intercept)	Age_08_04	KM	HP	cc
8137.15269	-109.33084	-0.01578	36.02651	-2.10101
Quarterly_Tax	weight			
5.89842	7.95569			

Conclusion- p-value is less than 0.05. and Multiple R- squared value is 0.863. This means the regression model will predict the output 86.3% time correct Residual standard error: 1342 on 1427 degrees of freedom

