Example 1 : Fit a multiple linear regression (MLR) equation to Y as a function of the other 5 variables in the following data table (SALES.csv) -

Sales	Time	MktPoten	Adver	MktShare	Change
3669.88	43.1	74065.1	4582.9	2.51	0.34
3473.95	108.13	58117.3	5539.8	5.51	0.15
2295.1	13.82	21118.5	2950.4	10.91	-0.72
4675.56	186.18	68521.3	2243.1	8.27	0.17
6125.96	161.79	57805.1	7747.1	9.15	0.5
2134.94	8.94	37806.9	402.4	5.51	0.15
5031.66	365.04	50935.3	3140.6	8.54	0.55
3367.45	220.32	35602.1	2086.2	7.07	-0.49
6519.45	127.64	46176.8	8846.3	12.54	1.24
4876.37	105.69	42053.2	5673.1	8.85	0.31
2468.27	57.72	36829.7	2761.8	5.38	0.37
2533.31	23.58	33612.7	1991.9	5.43	-0.65
2408.11	13.82	21412.8	1971.5	8.48	0.64
2337.38	13.82	20416.9	1737.4	7.8	1.01
4586.95	86.99	36272	10694.2	10.34	0.11
2729.24	165.85	23093.3	8618.6	5.15	0.04
3289.4	116.26	26878.6	7747.9	6.64	0.68
2800.78	42.28	39572	4565.8	5.45	0.66
3264.2	52.84	51866.2	6022.7	6.31	-0.1
3453.62	165.04	58749.8	3721.1	6.35	-0.03
1741.45	10.57	23990.8	861	7.37	-1.63
2035.75	13.82	25694.9	3571.5	8.39	-0.43
1578	8.13	23736.4	2845.5	5.15	0.04
4167.44	58.54	34314.3	5060.1	12.88	0.22
2799.97	21.14	22809.5	3552	9.14	-0.74

Y = Sales		y = sales figures for a sales rep
X1	Time	x_1=time the sales rep has been with the company
X2	MktPoten	x_2=market potential = produce sales in the sales territory
X3	Adver	x_3= $ advertising expense in the sales territory
X4	MktShare	x_4=weighted average market share of company over last 4 years
X5	Change	x_5 =change in market share of company over last 4 years

Open the data file SALES.csv in R.

Read the datafile SALES.csv in R.

Attach the dataframe d1.

```
> d1<-read.csv("g:/Stats24x7/R/SALES.csv",header=TRUE)

> attach(d1)

> names(d1)

[1] "Sales"    "Time"     "MktPoten" "Adver"    "MktShare" "Change"

> mlr1 <- lm(Sales ~ Time+MktPoten+Adver+MktShare+Change)

> mlr1
```

Fit multiple linear regression model to Sales as a function of the other variables in d1.

```
Call:

lm(formula = Sales ~ Time + MktPoten + Adver + MktShare + Change)

Coefficients:
(Intercept)         Time     MktPoten        Adver     MktShare       Change
 -1.114e+03    3.612e+00    4.209e-02    1.289e-01    2.570e+02    3.245e+02
```

OUTPUT from R.

R has created an object mlr1.

```
> summary(mlr1)

Call:
lm(formula = Sales ~ Time + MktPoten + Adver + MktShare + Change)
Residuals:
   Min      1Q  Median      3Q     Max
-602.82 -236.31  -69.97  260.52  732.78
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.114e+03  4.199e+02  -2.653  0.01571 *
Time         3.612e+00  1.182e+00   3.057  0.00649 **
MktPoten     4.209e-02  6.731e-03   6.253 5.27e-06 ***
Adver        1.289e-01  3.704e-02   3.479  0.00251 **
MktShare     2.570e+02  3.914e+01   6.566 2.76e-06 ***
Change       3.245e+02  1.573e+02   2.063  0.05301 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 430.2 on 19 degrees of freedom
Multiple R-squared: 0.915,      Adjusted R-squared: 0.8926
F-statistic: 40.91 on 5 and 19 DF,  p-value: 1.585e-09
```

Assess normality of residuals in R:

```
> qqnorm(mlr1$residuals)
> qqline(mlr1$residuals)
```