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.xlsx) -

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.xlsx in MINITAB, then click on

Stat/Regression (Figure 1a),

Select Sales as Response, the other 5 variables as Predictors, click on Options (Figure 1b) and then check Variance Inflation Factor box (Figure 1c)

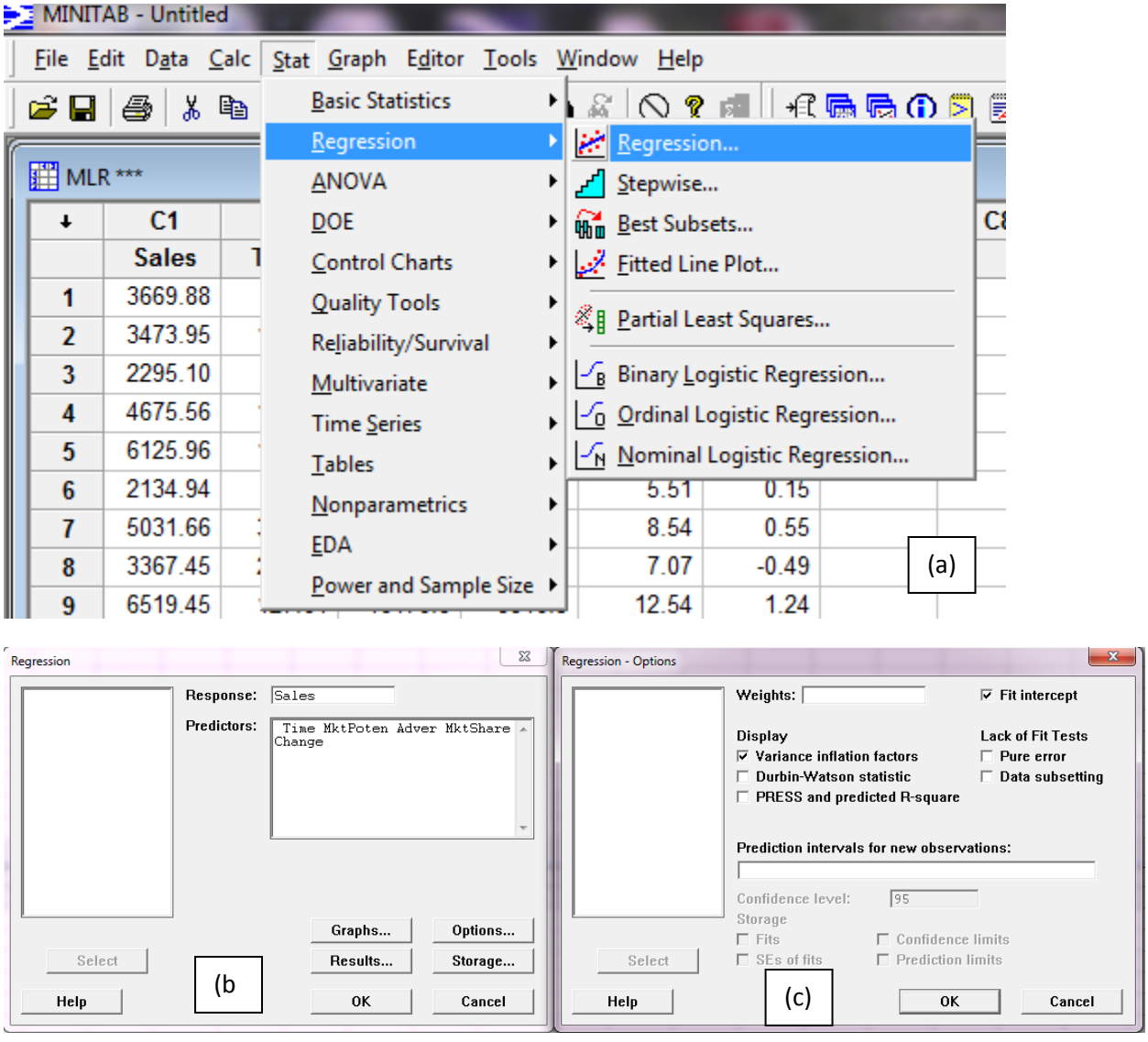

Figure 1: Running Multiple Linear Regression in MINITAB

The output from MINITAB is shown on the next page.

Regression Analysis: Sales versus Time, MktPoten, ...

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The regression equation is
Sales = - 1114 + 3.61 Time + 0.0421 MktPoten + 0.129 Adver + 257 MktShare
        + 325 Change

Predictor       Coef    SE Coef       T       P  VIF
Constant    -1113.8      419.9   -2.65   0.016
Time          3.612      1.182    3.06   0.006  1.4
MktPoten   0.042088   0.006731    6.25   0.000  1.5
Adver       0.12886    0.03704    3.48   0.003  1.3
MktShare     256.96      39.14    6.57   0.000  1.2
Change        324.5      157.3    2.06   0.053  1.2

S = 430.231   R-Sq = 91.5%   R-Sq(adj) = 89.3%

Analysis of Variance

Source           DF         SS        MS       F       P
Regression        5   37862671   7572534   40.91   0.000
Residual Error   19    3516878    185099
Total            24   41379549

Source     DF     Seq SS
Time        1   16056475
MktPoten    1    5172525
Adver       1    7701476
MktShare    1    8144133
Change      1     788062
```

Note that

(1) R^2 = 91.5% is high,

(2) all VIF values are close to 1 hence multicollinearity is not present (VIF values > 10 indicate serious multicollinearity among predictors),

(3) all variables (except Change) are highly significant,

(4) Residual plots do not indicate any problems, and residuals appear to be normally distributed (Figure 1d),

hence the fitted model is reasonable.

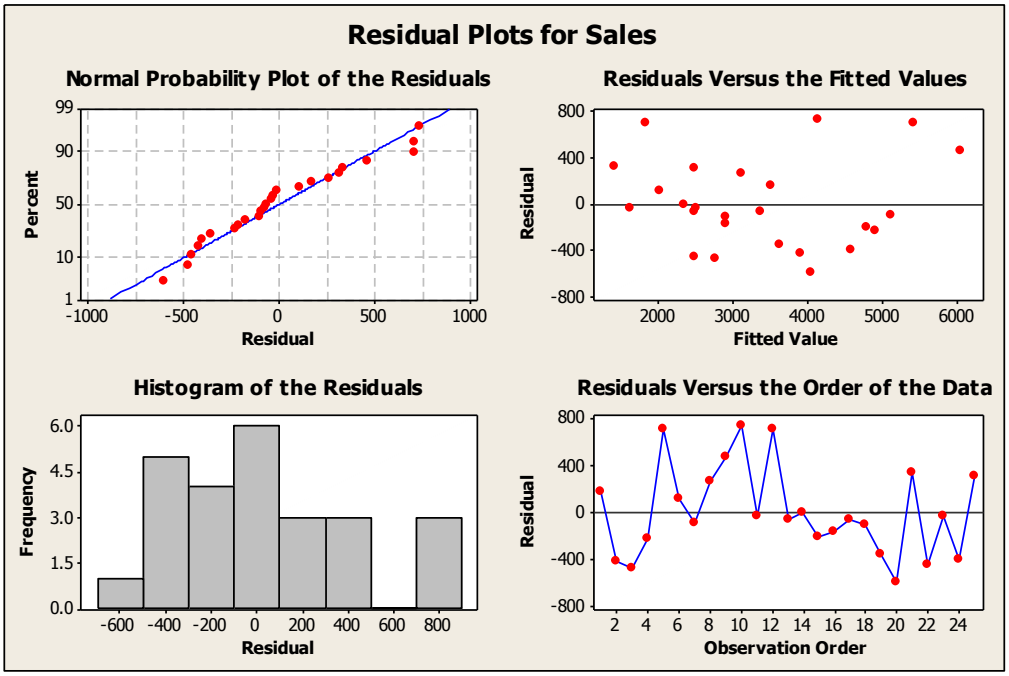

Figure 1d: Residual Plots from Regression procedure of MINITAB