Q.No.1:- Draw the scatter plot for $y$ against $x$.
(a) Does the regressor need any transformation before fitting the regression line?

(b) Identify the best transformation for $x$ using formal method of transforming the regressor variable.

(c) Fit the transformed model and perform the residual analysis for model adequacy.
Comments:
Q.No.2: Fit the multiple linear model of $y$ on both the regressors.

1) Find the values of
   (a) Sum of squares due to errors/residuals.

   (b) Sum of square due to lack of fit.

   (c) Sum of squares due to pure error.

2) Formally, test the significance of lack of fit using the F statistic.

   $H_0:$
   $H_1:$

   $F_0 =$ with $v_1 =$ and $v_2 =$

Decision and conclusion:

Some useful formulas

$$SST = y'y - \frac{(\sum y)^2}{n}, \quad SSR = SS_{Regression} = \hat{\beta}'X'y - \frac{(\sum y)^2}{n}, \quad SSE = SS_{Residuals} = y'y - \hat{\beta}'X'y$$

$$\sum_{i=1}^{m} \sum_{j=1}^{n_i} (y_{ij} - \hat{y}_i)^2 \quad \sum_{i=1}^{m} \sum_{j=1}^{n_i} (y_{ij} - \bar{y}_i)^2 \quad \sum_{i=1}^{m} n_i (\bar{y}_i - \hat{y}_i)^2$$

$$\frac{SSE}{DF=n-2} \quad \frac{SS_{PE}}{DF=n-m} \quad \frac{SS_{LOF}}{DF=m-2}$$

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_0 x + \hat{\gamma} w, \quad \text{where } w = x \ln x, \quad \alpha_i = \frac{\gamma_i}{\hat{\beta}_i} + \alpha_{i-1}$$

With the Best Wishes