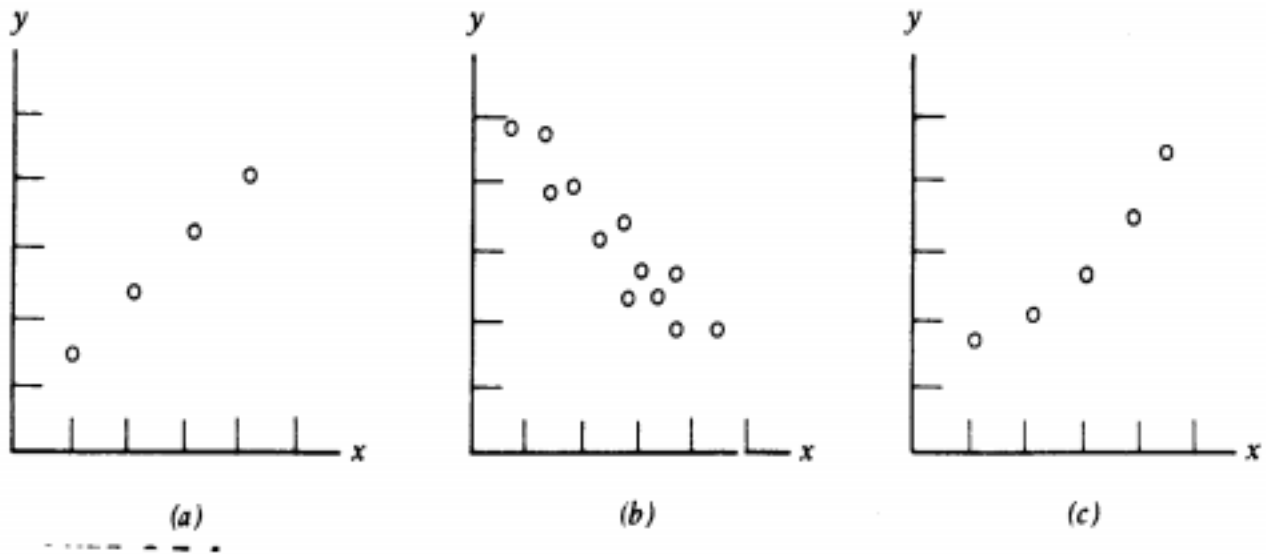


DATA ANALYSIS

❖ INTERPOLATION, EXTRAPOLATION

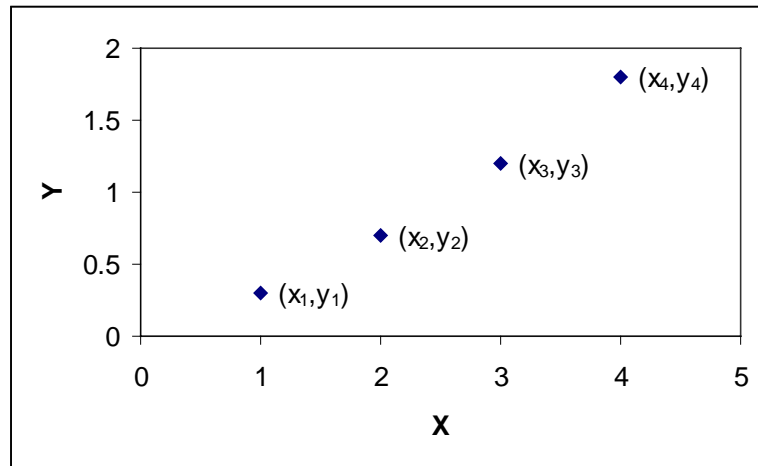


- ❖ **INTERPOLATION:** To estimate the value of dependent variable for a value of independent variable between tabulated points
- ❖ **EXTRAPOLATION:** To estimate the value of dependent variable for a value of independent variable beyond the range of the data table

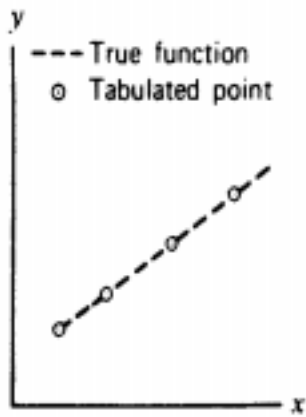
❖ TWO-POINT LINEAR INTERPOLATION

Example:

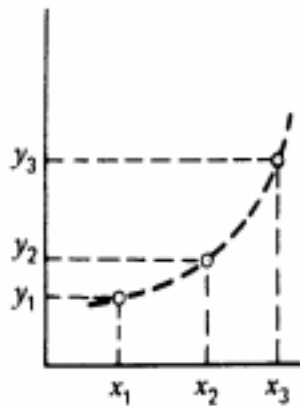
X	1.0	2.0	3.0	4.0
Y	0.3	0.7	1.2	1.8



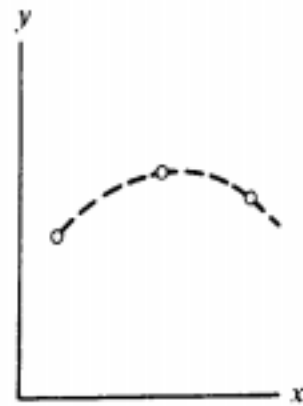
$$y = y_1 + \frac{x - x_1}{x_2 - x_1} (y_2 - y_1)$$



(a)



(b)



(c)

❖ FITTING A STRAIGHT LINE

If a plot of dependent variable versus independent variable appears to be a straight line, use the equation defining a line.

$$y = a x + b$$

Slope and intercept can be calculated by using two points (x_1, y_1) and (x_2, y_2) on the line.

Slope:

$$a = \frac{y_2 - y_1}{x_2 - x_1}$$

Intercept:

$$b = y_1 - a x_1$$

or

$$b = y_2 - a x_2$$

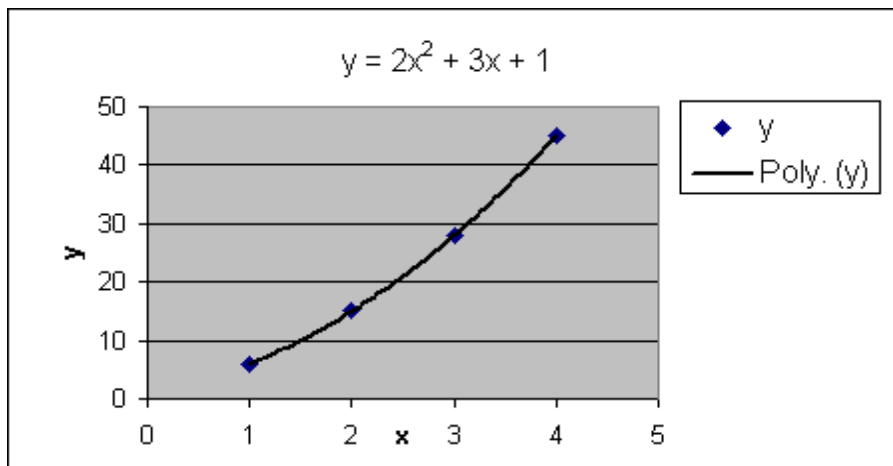
❖ FITTING NONLINEAR DATA

1) Find the suitable equation other than line

Example:

$$y = a x^2 + b x + c \text{ (polynomial)}$$

x	y
1	6
2	15
3	28
4	45



2) Some nonlinear equations can be plotted as straight line if the variables are redefined.

3) Equation can be rearranged to put into a straight line form.

Two common non-linear functions:

- Exponential function:

$$y = a e^{b x} \quad \text{or} \quad y = a \exp (bx)$$

- Power law function:

$$y = a x^b$$