

i	x_i	y_i	x_i^2	$x_i y_i$
1	10	25	100	250
2	20	70	400	1400
3	30	380	900	11400
4	40	550	1600	22000
5	50	610	2500	30500
6	60	1220	3600	73200
7	70	830	4900	58100
8	80	1450	6400	116000
Σ	360	5135	20400	312850

$$n=8$$

$$\Sigma x_i = 360$$

$$\Sigma y_i = 5135$$

$$\Sigma x_i^2 = 20400$$

$$\Sigma x_i y_i = 312850$$

$$\bar{x} = \frac{\Sigma x_i}{n} = 45$$

$$\bar{y} = \frac{\Sigma y_i}{n} = 641.875$$

$$S_r = \sum_{i=1}^n e_i^2 = \sum_{i=1}^n (y_i - a_0 - a_1 x_i)^2$$

$$1) \frac{\partial S_r}{\partial a_0} = -2 \Sigma (y_i - a_0 - a_1 x_i) \dots 0 \text{ 이 되도록}$$

$$\rightarrow \Sigma y_i = \Sigma a_0 + \Sigma a_1 x_i$$

$$\Rightarrow \Sigma y_i = n a_0 + (\Sigma x_i) a_1 \dots \textcircled{1}$$

$$2) \frac{\partial S_r}{\partial a_1} = -2 \Sigma [(y_i - a_0 - a_1 x_i) x_i] \dots 0 \text{ 이 되도록}$$

$$\rightarrow \Sigma x_i y_i = \Sigma a_0 x_i + \Sigma a_1 x_i^2$$

$$\Rightarrow \Sigma x_i y_i = (\Sigma x_i) a_0 + (\Sigma x_i^2) a_1 \dots \textcircled{2}$$

①, ②를 행렬로 나타내면,

$$\begin{Bmatrix} \Sigma y_i \\ \Sigma x_i y_i \end{Bmatrix} = \begin{bmatrix} n & \Sigma x_i \\ \Sigma x_i & \Sigma x_i^2 \end{bmatrix} \cdot \begin{Bmatrix} a_0 \\ a_1 \end{Bmatrix}$$

$$\therefore \begin{Bmatrix} a_0 \\ a_1 \end{Bmatrix} = \begin{bmatrix} n & \Sigma x_i \\ \Sigma x_i & \Sigma x_i^2 \end{bmatrix}^{-1} \cdot \begin{Bmatrix} \Sigma y_i \\ \Sigma x_i y_i \end{Bmatrix}$$

위 식을 MATLAB을 이용하여 계산하면, $a_0 = -234.2857$
 $a_1 = 19.4702$

$$\therefore \text{보간함수: } y = -234.2857 + 19.4702 x$$