Lab 3 STAT 151A

Data Table

X	Y	$X_i Y_i$	X_i^2	$\hat{Y}_i$	$E_i = Y_i - \hat{Y}_i$	E_i^2
5	3.5	17.5	25	3.539048	-0.039047 62	0.0015247166
6	3.8	22.8	36	3.750476	0.049523 81	0.0024526077
3	3.1	9.3	9	3.116190	-0.016190 48	0.0002621515
7	4	28	49	3.961905	0.038095 24	0.0014512472
4	3.2	12.8	16	3.327619	-0.127619 05	0.0162866213
2	3	6	4	2.904762	0.095238 10	0.0090702948

Step ①:

$$B = \frac{\sum_{i=1}^{6} X_i Y_i - n\bar{X}\bar{Y}}{\sum_{i=1}^{6} X_i^2 - n\bar{X}^2}$$

where $X = [5, 6, 3, 7, 4, 2]$, $\bar{X} = \frac{5+6+\cdots+2}{6} = 4.5$

$Y = [3.5, 3.8, 3.1, 4, 3.2, 3]$, $\bar{Y} = \frac{3.5+3.8+\cdots+3}{6} = 3.4333$

$$B = \frac{96.4 - 6 \cdot 4.5 \cdot 3.433}{139 - 6 \cdot (4.5)^2} = 0.2114286$$

$$\bar{Y} = A + B\bar{X} \Rightarrow A = \bar{Y} - B\bar{X} = 3.433 - 0.2114286 \cdot 4.5$$

$$= 2.481905$$

Step ②

$$\hat{Y}_i = A + BX_i \Rightarrow$$

$\hat{Y}_1 = 2.481905 + 5 \cdot 0.2114286 = 3.539048$

$\hat{Y}_2 = 2.481905 + 6 \cdot 0.2114286 = 3.750476$

$\hat{Y}_3 = 2.481905 + 3 \cdot 0.2114286 = 3.116190$

$\hat{Y}_4 = 2.481905 + 7 \cdot 0.2114286 = 3.961905$

$\hat{Y}_5 = 2.481905 + 4 \cdot 0.2114286 = 3.327619$

$\hat{Y}_6 = 2.481905 + 2 \cdot 0.2114286 = 2.904762$

$$E_i = Y_i - \hat{Y}_i \Rightarrow$$

$E_1 = 3.5 - 3.539048 = -0.039047 62$

$E_2 = 3.8 - 3.750476 = 0.049523 81$