

EE 325 Section 3 Take home quiz 2 February 27th, 2020 ☺

Data on X_i and Y_i are given in the table

i	X_i	Y_i
1	4	6
2	3	5
3	2	4
4	8	10
5	1	3

Suppose you decide to fit the following model

$$Y_i = \beta_1 + \beta_2 X_i + u_i \quad \text{where } u_i \sim \text{NIID}(0, \sigma^2)$$

$$\sum X_i = 18, \sum Y_i = 28$$

$$\bar{X} = 3.6, \bar{Y} = 5.6$$

$$\sum (X_i - \bar{X})^2 = 29.2$$

$$\sum (X_i - \bar{X})(Y_i - \bar{Y}) = 29.2$$

$$\sum X_i Y_i = 130, \sum X_i \sum Y_i = 504, \left(\sum X_i \right)^2 = 94$$

Compute estimators of β_1 and β_2 ($\hat{\beta}_1$ and $\hat{\beta}_2$).

Interpret the regression.

$$\begin{aligned} \hat{\beta}_2 &= \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \\ &= \frac{29.2}{29.2} = 1 \end{aligned}$$

$$\begin{aligned} \hat{\beta}_1 &= \bar{y} - \hat{\beta}_2 \bar{x} \\ &= 5.6 - (1)3.6 = 2 \end{aligned}$$

$\hat{\beta}_2 = 1$ means that if x change by 1 unit, on average, y will change by 1 unit in the same direction.