Basic Statistics – Forum Week 10

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Exercise 1

1. $Y' = bX + A$

$$b = \frac{\Sigma(X_i - \bar{X})(Y_i - \bar{Y})}{\Sigma(X_i - \bar{X})^2}$$

$$\bar{X} = \frac{1+2+3+4+5+6+7+8+9+10}{10} = 5.5$$

$$\bar{Y} = \frac{52+59+62+64+72+80+74+83+91+89}{10} = 72.6$$

$$A = \bar{Y} - b \cdot \bar{X}$$

$$b = \left[\Sigma(X_i \cdot Y_i) - \frac{\Sigma X_i \cdot \Sigma Y_i}{n}\right] \div \left[\Sigma X_i^2 - \frac{(\Sigma X_i)^2}{n}\right]$$

$$= \left(5582 - \frac{55 \cdot 726}{10}\right) \div \left(385 - \frac{55^2}{10}\right)$$

$$= 350 \div 82.5$$

$$= 4.24$$

$$A = \bar{Y} - b \cdot \bar{X}$$

$$= (72.6) - (4.24) \cdot (5.5)$$

$$= 49.27$$

$$Y' = 49.27 + 4.24X$$

2. $Y' = 49.27 + 4.24 \cdot 7 = 78.96$

In the table, $Y = 74$. It's different because the regression line does not take into consideration factors such as individual variations and is simply an estimate based on data trends.

3. $Y' = 49.27 + 4.24 \cdot 11 = 95.93$

## Exercise 2

1. $\bar{X} = \frac{\Sigma X}{n} = \frac{60+62+64+66+68}{5} = 64$

$\bar{Y} = \frac{\Sigma Y}{n} = \frac{140+145+160+170+155}{5} = 154$

$b = \frac{\Sigma(X_i - \bar{X})(Y_i - \bar{Y})}{\Sigma(X_i - \bar{X})^2} = \frac{110}{40} = 2.75$

$A = \bar{Y} - b\bar{X}$
$= 154 - (2.75)(64)$
$= -22$

$Y' = 2.75X - 22$

2. $Y' = 2.75(70) - 22$
$= 170.5$

170.5 lbs