

Conditions

compute standard error of estimate for data below

x values= 3,-2,2,5,10

y values= 4,6,-2,0,-3

Solution

The formula for calculation of standard error:

$$SE = \frac{\sigma}{\sqrt{n}}$$

where

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}, \quad \text{where } \mu = \frac{1}{N} \sum_{i=1}^N x_i.$$

$$\mu_x = \frac{1}{5} (3 - 2 + 2 + 5 + 10) = 3,6$$

$$\mu_y = \frac{1}{5} (4 + 6 - 2 + 0 - 3) = 1$$

$$\sigma_x = \sqrt{\frac{1}{5} ((3 - 3,6)^2 + (-2 - 3,6)^2 + (2 - 3,6)^2 + (5 - 3,6)^2 + (10 - 3,6)^2) =$$

$$= \sqrt{\frac{1}{5} (0,36 + 31,36 + 2,56 + 1,96 + 40,96)} = \sqrt{15,44} \approx 3,929$$

$$\sigma_y = \sqrt{\frac{1}{5} ((4 - 1)^2 + (6 - 1)^2 + (-2 - 1)^2 + (0 - 1)^2 + (-3 - 1)^2) =$$

$$= \sqrt{\frac{1}{5} (9 + 25 + 9 + 1 + 16)} = \sqrt{12} = 2\sqrt{3}$$

$$SE_x = \frac{3,929}{\sqrt{5}} \approx 1,757$$

$$SE_y = \frac{2\sqrt{3}}{\sqrt{5}} \approx 1,549$$