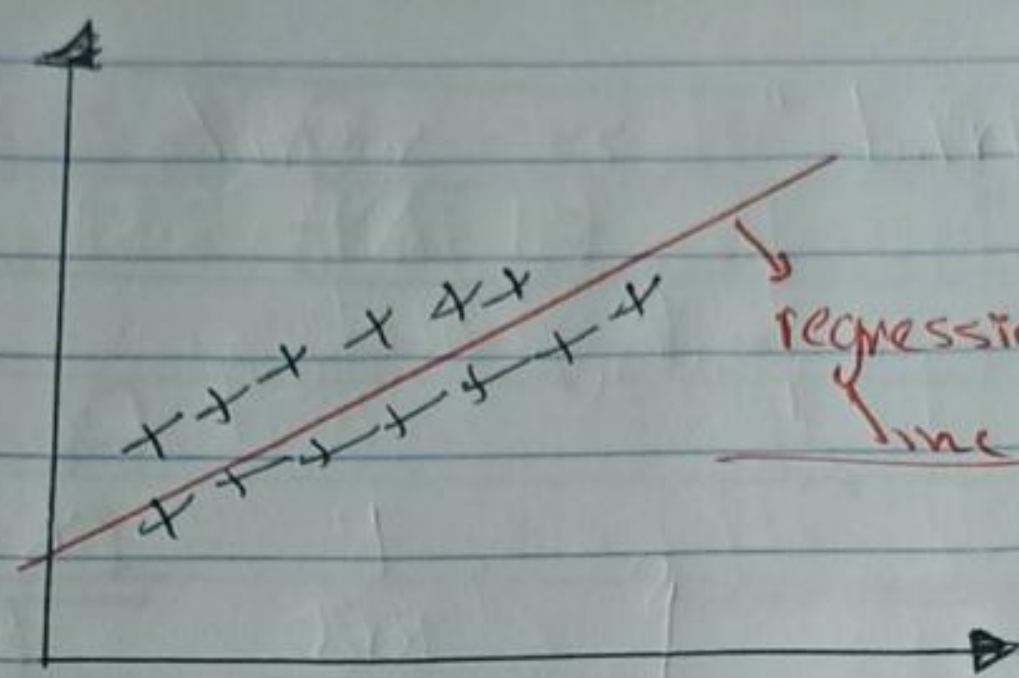


112.211 least squares Method

The least squares Method is a procedure for using sample data to find the estimated regression equation

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باستخدام بيانات العينات



Estimated regression equation

$$y = \underline{a}x + b$$

$$\hat{y}_i = b_0 + b_1 x_i$$

\hat{y}_i → Estimated value of y [when y = dependent variable]

القيمة المتوقعة للمتغير التابع

b_0 → y -intercept for the estimated regression line

b_1 → The slope of the estimated regression line

x_i → independent variable in the value

least square Method use the sample data to provide the value of b_0 and b_1 that minimize the sum of squares of the deviation between the observed values and dependent variable y_i and the estimated value of the dependent value.

$$\text{Min } \sum (y_p - \hat{y}_p)^2$$

$y_p \rightarrow$ observed value of the dependent variables of observation

$\hat{y}_p \rightarrow$ estimated value of dependent variables

A	B	r
1	2	3

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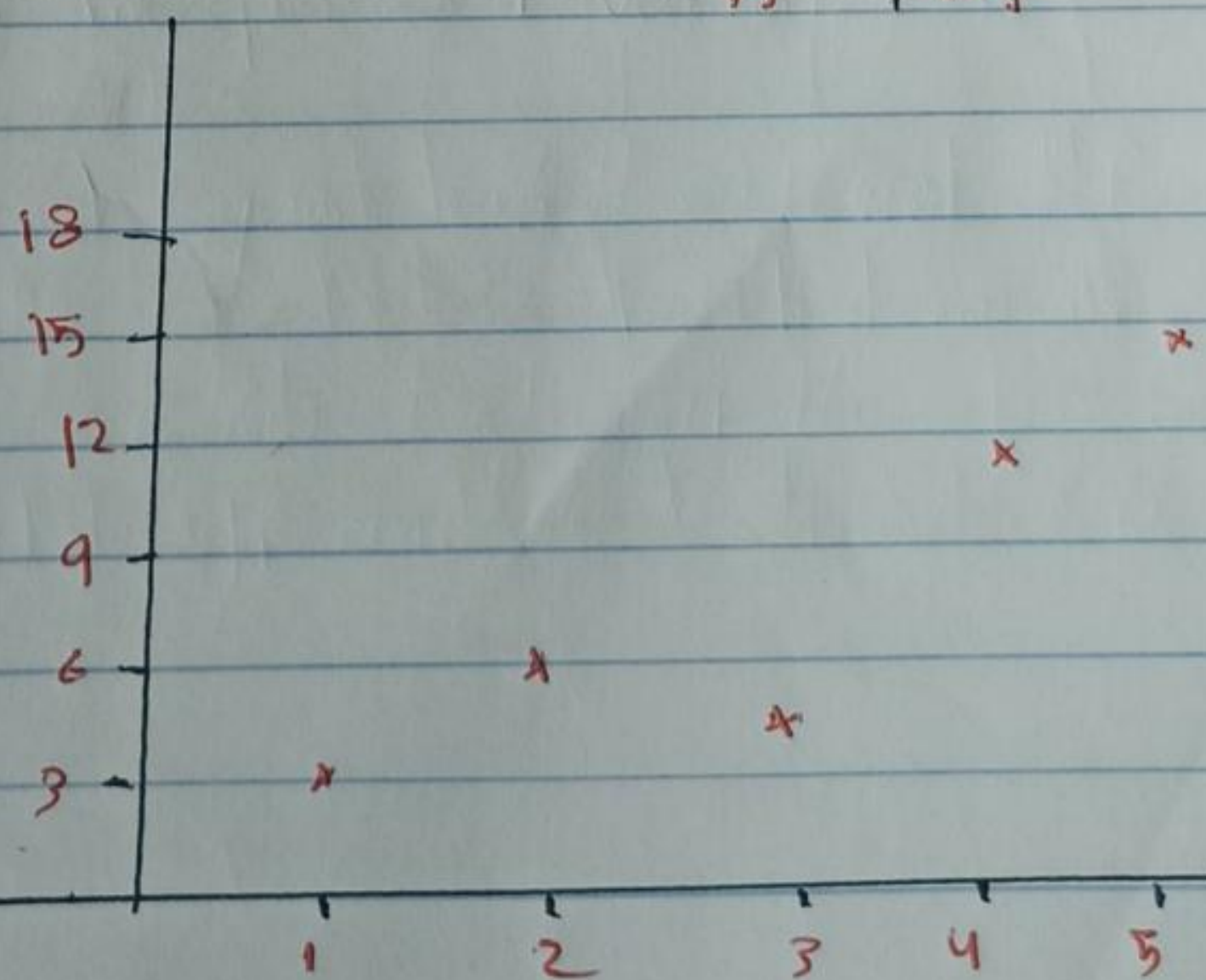
$$b_0 = \frac{A}{1}$$

$$b_1 = \frac{B}{2}$$

$$b_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \quad , \quad b_0 = \bar{y} - b_1 \bar{x}$$

Example \rightarrow

x	y
1	3
2	7
3	5
4	11
5	14



Develops scatter diagram

15) what does the scatter diagram indicate about the relationship

positive linear

16) develop the estimated regression by computing the values of b_0 and b_1 and use it to predict y at $x = 10$?

using the Calculator

المعادلة هي $y = 0.2 + 2.6x$

$$\hat{y} = b_0 + b_1 x$$

$$b_0 = A = 0.2$$

$$b_1 = B = 2.6$$

$$\hat{y} = 0.2 + 2.6 x$$

$$\hat{y} \Big|_{x=4} = 0.2 + 2.6 (4)$$

$$x = 10.6$$