* Assignment :-

→ $y = mx + b$

$\Sigma y = m\Sigma x + nb$

$\frac{\Sigma x}{n} = m\frac{\Sigma x}{n} + b \Rightarrow \bar{y} = m\bar{x} + b$

$\bar{y}$ & $\bar{x}$ are means

→ Also, $m = \frac{\text{Covariance } (x, y)}{\text{Variance } (x)} = \frac{SS_{xy}}{SS_{xx}}$

$SS_{xy} = \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})$

$SS_{xx} = \sum_{i=1}^{n} (x_i - \bar{x})^2$

$m = \frac{SS_{xy}}{SS_{xx}} = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2}$

→ Also, $b = \bar{y} - m\bar{x}$

→ For the above data :-

$\bar{y} = \frac{5+6+7+6+9+8+8+10+12+12}{10} = \frac{83}{10} = \underline{\underline{8.3}}$

$\bar{x} = \frac{0+2+4+6+9+11+12+15+17+19}{10} = \frac{95}{10} = \underline{\underline{9.5}}$

$\rightarrow$ $SS_{xy} = (0-9.5)(5-8.3) + (2-9.5)(6-8.3)$
$+ (19-9.5)(12-8.3)$

$\rightarrow$ $SS_{xx} = (0-9.5)^2 + (2-9.5)^2 + \dots\dots + (19-9.5)^2$

$\Rightarrow$ For the above data :-

$\Sigma x = 95$; $\Sigma y = 83$, $n = 10$
$\Sigma xy = 923$, $\Sigma x^2 = 1277$

$$m = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2}$$

$$m = \frac{(10\times 923) - (95)(83)}{(10\times 1277) - (95^2)} = 0.3591$$

$b = \bar{y} - m\bar{x} = 8.3 - (0.3591)(9.5)$
$b = 4.8881$

$\therefore$ Regression eq^n :-

$$\boxed{y = 0.3591x + 4.881}$$

VISION