Answer on Question #83863 – Math – Statistics and Probability Question

Variance of $x = 9$
Regression equations $8x - 10y + 66 = 0, 40x - 18y - 214 = 0$
Find the standard deviation of y.

Solution

On solving the two equations, we can obtain the mean values for x and y

$8x - 10y + 66 = 0$
$40x - 18y - 214 = 0$

$40x - 50y + 330 = 0$
$40x - 18y - 214 = 0$

$40x - 50y + 330 = 0$
$32y - 544 = 0$

$40x - 50(17) + 330 = 0$
$y = 17$

$\overline{x} = 13$
$\overline{y} = 17$

$8x - 10y + 66 = 0$
$y = \frac{4}{5}x + \frac{33}{5}$
$b_{yx} = \frac{4}{5} > 0$

$40x - 18y - 214 = 0$
$x = \frac{9}{20}y + \frac{107}{20}$
$b_{xy} = \frac{9}{20} > 0$

Coefficient of correlation
$r^2 = b_{yx} \times b_{xy}$
$r > 0, r = \sqrt{\frac{4}{5} \cdot \frac{9}{20}} = \frac{6}{10} = \frac{3}{5}$

$Var(X) = \sigma_X^2 = 9 => \sigma_X = \sqrt{9} = 3$
$\sigma_Y = \frac{b_{yx}\sigma_X}{r}$

$$\sigma_Y = \frac{\frac{4}{5}(3)}{\frac{3}{5}} = 4$$

Answer: $\sigma_Y = 4$.