## Answer on Question \#46486 - Math - Statistics and Probability

In order to find the correlation coefficient between two variables $X$ and $Y$ from 20 pairs of observations, the following calculations were made:
$\Sigma x=15, \Sigma y=-6, \Sigma x y=50, \Sigma x^{\wedge} 2=61$ and $\Sigma y^{\wedge} 2=90$.
Calculate the correlation coefficient, and the slope of the regression line of $Y$ on $X$.

## Solution

Correlation coefficient is calculated as follows:

$$
\begin{gathered}
r_{x y}=\frac{\sum x_{i} y_{i}-n \bar{x} \bar{y}}{(n-1) s_{x} s_{y}}=\frac{n \sum x_{i} y_{i}-\sum x_{i} \sum y_{i}}{\sqrt{n \sum x_{i}^{2}-\left(\sum x_{i}\right)^{2}} \sqrt{n \sum y_{i}^{2}-\left(\sum y_{i}\right)^{2}}} \\
r_{x y}=\frac{20 \cdot 50-15 \cdot(-6)}{\sqrt{20 \cdot 61-15^{2}} \cdot \sqrt{20 \cdot 90-6^{2}}}=0.823
\end{gathered}
$$

The slope of the regression line of Y on X is calculated as follows:

$$
a=r \frac{s_{x}}{s_{y}}=\frac{n \sum x_{i} y_{i}-\sum x_{i} \sum y_{i}}{n \sum x_{i}{ }^{2}-\left(\sum x_{i}\right)^{2}}=\frac{20 \cdot 50-15 \cdot-6}{20 \cdot 61-15^{2}}=1.095
$$

