**Example NO.3**

**Compute the least squares regression equation of Y on X for the following .what is the regression co efficient and what does it mean?**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | **5** | **6** | **8** | **10** | **12** | **13** | **15** | **16** | **17** |
| **y** | **16** | **19** | **23** | **28** | **36** | **41** | **44** | **45** | **50** |

**Solution**

The estimated regression line is Y on X is

$\hat{Y}$**=a+bX**

**Necessary calculations are :**

|  |  |  |  |
| --- | --- | --- | --- |
| **x** | **y** | **xy** | $$x^{2}$$ |
| 5 | 16 | 80 | 25 |
| 6 | 19 | 114 | 36 |
| 8 | 23 | 184 | 64 |
| 10 | 28 | 280 | 100 |
| 12 | 36 | 432 | 144 |
| 13 | 41 | 533 | 169 |
| 15 | 44 | 660 | 225 |
| 16 | 45 | 720 | 256 |
| 17 | 50 | 850 | 289 |
| $\sum\_{}^{}x$**=102** | $\sum\_{}^{}y$**=302** | $\sum\_{}^{}xy$**=3853** | **1308** |

Here y on x so

**byx =**$\frac{n\sum\_{}^{}xy-\left(\sum\_{}^{}x\right)\left(\sum\_{}^{}y\right)}{n\sum\_{}^{}x^{2}-\left(\sum\_{}^{}x\right)^{2}}$

$$Type equation here.$$

n=9

$b\_{yx}$=$\frac{9\left(3853\right)-(102)(302)}{9\left(1308\right)-\left(102\right)^{2}}$

b= 2.831

now we have to find a so

**a**$=\overbar{Y}$**-b**$\overbar{X}$

$\overbar{Y}=\frac{\sum\_{}^{}y}{n}$ **=**$\frac{302}{9}$**=33.56**

$\overbar{X}=\frac{\sum\_{}^{}x}{n}$**=**$\frac{102}{9}$**=11.33**

**a**=33.56-2.831(11.33)

**a=1.47**

**Hence the desire estimated regression equation is**

$\hat{Y}$**=a+b**$X\_{i}$**+**$ ε$

$$\hat{Y}=1.47+2.831X$$