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SL:- 14

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x	y	xy	x^2	y^2
11.8	10.4	122.72	139.24	108.16
12.5	16.5	206.25	159.25	272.25
15.7	22.9	359.53	246.49	524.41
19.2	26.6	510.72	368.64	707.56
21.9	33.8	740.22	479.61	1142.44
23.3	42.8	997.24	542.89	1831.84
$\Sigma x = 104.4$	$\Sigma y = 153$	$\Sigma xy = 2936.68$	$\Sigma x^2 = 1933.12$	$\Sigma y^2 = 4586.66$

a) Compute correlation coefficient:-

$$SS(x) = \Sigma x^2 - \frac{(\Sigma x)^2}{n}$$

$$= 1933.12 - \frac{(104.4)^2}{6}$$

$$= 116.56$$

$$SS(y) = \Sigma y^2 - \frac{(\Sigma y)^2}{n}$$

$$= 4586.66 - \frac{(153)^2}{6}$$

$$= 685.16$$

$$SP(xy) = \Sigma xy - \frac{\Sigma x \Sigma y}{n}$$

$$= 2936.68 - \frac{(104.4 \times 153)}{6}$$

$$= 274.48$$

$$\therefore r = \frac{SP(xy)}{\sqrt{SS(x) SS(y)}}$$

$$= \frac{274.48}{\sqrt{116.56 \times 685.16}}$$

$$= 0.98$$

∴ The correlation between variable (x) and (y) is strongly positive.

b) Performing Hypothesis test,

$H_0 : \rho = 0$ against $H_A : \rho \neq 0$

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \sim t_{n-2}$$

$$= \frac{0.98\sqrt{6-2}}{\sqrt{1-(0.98)^2}} = 9.84$$

$\therefore |t| > t_{(n-2)} = 4$, So, H_0 is rejected.

We conclude that the lending rate does not increase significantly with increase of inflation rate.

c) Fitting regression line of y on x

$$a = \bar{y} - b\bar{x} = \frac{\Sigma y}{n} - b\frac{\Sigma x}{n}$$

$$= \frac{153}{6} - b\frac{104.4}{6} \quad \text{—①}$$

$$b = \frac{SP(xy)}{SS(x)} = \frac{274.48}{116.56} = 2.36$$

From (1)

$$a = \frac{153}{6} - (2.36)\frac{104.4}{6}$$

$$= -15.564$$

Fitted line: $\hat{y} = -15.564 + 2.36x$

d) Lending rate when the inflation rate will be 25.5

If, $x = 25.5$ then, $y = 15.564 + (2.36 \times 25.5)$

$= 44.616$ Ans

(c) we need to test $H_0 : \beta = 0$ Vs $H_1 : \beta \neq 0$

Test statistic:

$$|t| = \frac{b}{\sqrt{\frac{s^2}{SS(x)}}}$$

$$s^2 = \frac{SS(y) - b\,Sp(xy)}{n-2}$$

$$= \frac{685.16 - (2.36 \times 274.48)}{6-2}$$

$$= 523.2168$$

$$|t| = \frac{2.36}{\sqrt{\frac{523.2168}{116.56}}}$$

$$= 1.11$$

$\therefore |t| < t_4 = 2.776$

So, H_0 is accepted.

Hence, the regression is not significant.