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Section = [O]
Serial = 07

Assignment-04

x	y	xy	x^2	y^2
11.8	10.4	122.72	139.24	108.16
12.5	16.5	206.25	156.25	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)

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

$$= 1933.12 - \frac{(104.4)^2}{6} = 116.56$$

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

$$= 4586.66 - \frac{(153)^2}{6} = 685.16$$

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

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

$$= 274.48$$

Now

$$r = \frac{SP(xy)}{\sqrt{SS(x)\,SS(y)}} = \frac{274.48}{\sqrt{116.56 \times 685.16}} = 0.97$$

Inflaction rate(x) and lending rate(y) are positivly correlated.

(b) we need to test

$$H_0: \rho = 0 \text{ Vs } H_1: \rho \neq 0$$

Test statistic:

$$t = \frac{R\sqrt{n-2}}{\sqrt{1-R^2}}$$

$$= \frac{0.97\sqrt{6-2}}{\sqrt{1-0.97^2}}$$

$$= 7.98$$

Since $|t| > t_{n-2} = 2.776$

So, H_0 is Rejected.

we can conclude that lending rate of the inflation rate is not significantly correlated.

(c) $SS(x) = 116.56$ [For question NO-a)

$SS(y) = 685.16$ → " " " a

$SP(xy) = 274.48$ → " " " a

Now,

$$b = \frac{SP(xy)}{SS(x)} = \frac{274.48}{116.56} = 2.35$$

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

$$= \frac{153}{6} - 2.35\left(\frac{(104.4)}{6}\right)$$

$$= -15.39$$

Fitted line $\hat{y} = a + bx = -15.39 + 2.35x$

(d) If $x = 25.5$

Then, $\hat{y} = -15.39 + 2.35(25.5)$

$= -15.39 + 59.92$

$= 44.535$

(e) We need to test $H_0 : \beta = 0$ Vs $H_1 : \beta \neq 0$

Test statistic $t = \dfrac{b}{\sqrt{\frac{s^2}{SS(x)}}} = \dfrac{2.35}{\sqrt{\frac{(10.03)^2}{116.56}}} = 2.52$

Now,

$$s^2 = \frac{SS(y) - b\,SP(xy)}{n-2} = \frac{685.16 - 2.35(274.48)}{6-2}$$

$$= 10.03$$

Since $|t| < t_{n-2;\alpha}$ H_0 is Accepted.

Hence the regression is significant.