Sahil Kaundal
21BCS8197

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Surprise Test-3

Q2. Ans.

x	y	xy	x^2	y^2
1	2	2	1	4
3	6	18	9	36
4	8	32	16	64
5	10	50	25	100
7	14	98	49	196
8	16	128	64	256
10	20	200	100	400
$\Sigma x = 38$	$\Sigma y = 76$	$\Sigma xy = 528$	$\Sigma x^2 = 264$	$\Sigma y^2 = 1056$

$$r = \frac{\Sigma xy - \frac{(\Sigma x)(\Sigma y)}{N}}{\sqrt{\Sigma x^2 - \frac{(\Sigma x)^2}{N}}\sqrt{\Sigma y^2 - \frac{(\Sigma y)^2}{N}}}$$

$$= \frac{528 - \frac{38 \times 76}{7}}{\sqrt{264 - \frac{(38)^2}{7}}\sqrt{1056 - \frac{(76)^2}{7}}}$$

$$= \frac{528 - \frac{2888}{7}}{\sqrt{264 - \frac{1444}{7}}\sqrt{1056 - \frac{5776}{7}}} \Rightarrow \frac{528 - 412.57}{\sqrt{264 - 206.28}\sqrt{1056 - 825.14}}$$

$$\Rightarrow \frac{115.43}{\sqrt{57.72}\sqrt{230.86}} \Rightarrow \frac{115.43}{7.59 \times 15.19} \Rightarrow 1.00 = 1$$

As the correlation coefficient b/w the 2 variables is +1, so the 2 variables are perfectly positive correlated.

Ans: $\Sigma x_i = 63+63+64+65+66+69+70+70+71 = 601$

$\bar{x} = \Sigma x_i / n = 601/9 = 66.77.$

x_i	$D_i = (x_i - \bar{x})$	$(D_i)^2$
63	-3.77	14.2129
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64	-2.77	7.6729
65	-1.77	3.1329
66	-0.77	0.5929
69	2.23	4.9729
70	3.23	10.4329
70	3.23	10.4329
71	4.23	17.8929
		$\Sigma D_i = 83.5561$

$$S = \sqrt{\frac{\Sigma D_i^2}{n-1}} = \sqrt{\frac{83.5561}{9-1}} = \sqrt{\frac{83.5561}{8}}$$

$$= \sqrt{10.4445} = 3.2317$$

The null hypothesis H_0: $\mu = 65$ inches

The alternative hypothesis: $\mu \neq 65$ inches

Gitical value $(t_n) = 2.262$

The $d_f = n-1 = 9-1 = 8$

$$t = \frac{|\bar{x} - \mu|}{S} \cdot \sqrt{n}$$

$$= \frac{67-65}{3.2317} \times \sqrt{9} \rightarrow \frac{2}{3.2317} \times 3$$

$$= 1.8566.$$

Since $|t| < t_n$, H_0 is accepted.

∴ The height of the universe is 65 inches.