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Question: 5) Blood samples of 5 people were sent to each of two labora...

5) Blood samples of 5 people were sent to each of two laboratories (Lab 1 and Lab 2) for cholesterol determinations. The resulting data are summarized here:

| Lab 1 | Lab 2 |
|-------|-------|
| 276 | 318 |
| 270 | 287 |
| 265 | 285 |
| 300 | 262 |
| 280 | 296 |

The (population) mean cholesterol levels reported by Lab 1 is less than the (population) mean cholesterol levels reported by Lab 2? Test this at 10% level of significance.

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Blood Samples of 5 people were sent to each of two laboratories

Required information is given by,

Lab 1 \rightarrow 276 270 265 300 280

Lab 2 \rightarrow 318 287 285 262 296

\rightarrow we have to obtain mean and standard deviations for

Lab 1 and Lab 2 is,

Lab 1:-

\Rightarrow Mean is,

$$\bar{x}_1 = \frac{\sum x_i}{n}$$

$$= \frac{[276 + 270 + 265 + 300 + 280]}{5}$$

$$= \frac{1391}{5}$$

$$\boxed{\bar{x}_1 = 278.2}$$

\Rightarrow Standard deviation is,

$$s_1 = \sqrt{\frac{\sum (x_i - \bar{x}_1)^2}{(n-1)}}$$

$$s_1 = \sqrt{\frac{[276 - 278.2]^2 + [270 - 278.2]^2 + [265 - 278.2]^2 + [300 - 278.2]^2 + [280 - 278.2]^2}{[5-1]}}$$

$$s_1 = \sqrt{\frac{724.8}{4}}$$

$$= \sqrt{181.2} = \boxed{13.4610}$$

Lab 2:-

\Rightarrow Mean is,

$$\bar{x}_2 = \frac{\sum x_i}{n}$$

$$= \frac{[318 + 287 + 285 + 262 + 296]}{5}$$

$$= \frac{1448}{5}$$

$$\boxed{\bar{x}_2 = 289.6}$$

\Rightarrow Standard deviation is,

$$s_2 = \sqrt{\frac{\sum (x_i - \bar{x}_2)^2}{(n-1)}}$$

$$= \sqrt{\frac{[318 - 289.6]^2 + [287 - 289.6]^2 + [285 - 289.6]^2 + [262 - 289.6]^2 + [296 - 289.6]^2}{[5-1]}}$$



$$s_2 = \sqrt{409.3}$$

$$(s_2 = 20.2311)$$

then

$$\bar{x}_1 = 278.2 \quad \bar{x}_2 = 289.6$$

$$s_1 = 13.4610 \quad s_2 = 20.2311$$

$$n_1 = 5 \quad n_2 = 5$$

and $\alpha = 0.10 = \text{level of significance}$.

Calculation:-

(3)

(a) State the null and alternative hypothesis

We have to state the null and alternative hypothesis is,

then

→ Null hypothesis is

$$H_0: \mu_1 = \mu_2$$

→ Alternative hypothesis is

$$H_a: \mu_1 < \mu_2 \quad \text{[Left-tail]}$$

(b) Find the test statistic

We have to obtained the test statistic is

then

→ test statistic is,

$$t = \frac{[\bar{x}_1 - \bar{x}_2]}{\sqrt{sp^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \quad \text{--- (a)}$$

where,

$$sp^2 = \frac{(5-1)(20.2311)^2 + (5-1)(13.4610)^2}{(5+5-2)}$$

$$= \frac{1637.189 + 724.794}{8}$$

$$= \frac{2361.983}{8}$$

$$sp^2 = 295.247$$

$$\begin{aligned}
 t &= \frac{278.2 - 289.6}{\sqrt{295.247 * (\frac{1}{5} + \frac{1}{5})}} \\
 &= \frac{-11.4}{\sqrt{118.0988}} \\
 &= \frac{-11.4}{10.8673} \\
 &= \boxed{-1.049}
 \end{aligned}$$

therefore

t-test is

④ Find the p-value:-

We have to obtained the p-value is,

Then,

→ p-value is

p-value = [t-test, $df = n_1 + n_2 - 2$]

= [-1.049, $df = 5 + 5 - 2$]

= [-1.049, 8]

= $\boxed{0.1624}$

therefore

p-value is $\boxed{0.1624}$

⑤ Decision:-

We have to obtained the decision is,

Then,

→ p-value > α

$0.1624 > 0.10$

Fail to reject null hypothesis at $\alpha = 0.10$

therefore

Do not reject H_0 at $\alpha = 0.10$. There is insufficient evidence to support the claim.

Practice with similar questions

Q: 5) Blood samples of 5 people were sent to each of two laboratories (Lab 1 and Lab 2) for cholesterol determinations. The resulting data are summarized here: Lab 1 276 270 265 300 280 Lab 2 318 287 285 262 296 The (population) mean cholesterol levels reported by Lab 1 is greater than the (population) mean cholesterol levels reported by Lab 2? Test this at 10% level of significance...

A: [See answer](#)

Up next for you in Statistics and Probability

Q1. Industrial engineers periodically conduct "work measurement" analyses

See answer

Use Excel to calculate different statistical measures. You must include excel

Q2. An economist is interested in the relationship between the disposable income of a family and the amount of money spent annually on food. For a preliminary study, the economist takes a random sample of TEN middle-income families of the same size father, mother, two children). The results are as follows, where x denotes disposable income, in thousands of dollars, and y denotes food expenditure, in hundreds of taka.

| | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| x | 30 | 36 | 27 | 20 | 16 | 24 | 19 | 25 | 20 | 34 |
| y | 35 | 30 | 42 | 40 | 37 | 26 | 39 | 43 | 40 | 51 |

a. Identify the predictor and response variables.

b. Determine the correlation coefficient and coefficient of determination and

See answer

See more questions for subjects you study

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