

Conditions

Test the significance of differences between the two samples using the following data

Sample Scores

First Sample

10 9 8 7 5 7 8 9 9 7 3

Second sample 16 14 11 10 6 5 12 13 15

11 3

Solution

This is a task for independent two-sampled test.

For this test, the null hypothesis is that the means of samples are equal:

$$H_0: M_1 = M_2$$

$$H_a: M_1 \neq M_2$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1 X_2} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$S_{X_1 X_2} = \sqrt{\frac{1}{2}(S_{\bar{X}_1}^2 + S_{\bar{X}_2}^2)}$$

$$S_{\bar{X}_1}^2 = \frac{\sum_{i=1}^{11}(X_1 - \bar{X}_1)^2}{n}$$

$$S_{\bar{X}_2}^2 = \frac{\sum_{i=1}^{11}(X_2 - \bar{X}_2)^2}{n}$$

For this example:

$$t = 2.188$$

The degrees of freedom:

$$k = 11 + 11 - 2 = 20$$

For these degrees of freedom the t-criteria value is:

2.08600– for p=0.95

$$t=2.188 > 2.086$$

We can make a conclusion, that with probability 95% there is a difference between 2 groups.
H0 is rejected.

