Conditions

Ten participants in a physical fitness program had their fasting blood sugar levels taken at the start of the program. They were taken again on day 21. The readings are given in the table below.

Start 105 94 107 111 109 111 102 124 109 102
Day 21 92 108 104 102 93 85 93 BB 103 90

It has been conjectured that the physical fitness program will lower the mean

level. I have included two sets of possible output for the test. Assume both sets of measurements come from Normal populations. Tell which you would choose as the appropriate one and why. write down the hypotheses and level of significance for the test at the 5% level. Then give your decision and conclusion.

Solution

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

$$H_0: M_1 = M_2$$

$$H_a: M_1 \neq M_2$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1X_2}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}},$$

$$S_{X_1X_2} = \sqrt{\frac{1}{2}\left(S_{X_1}^2 + S_{X_2}^2\right)}$$

$$S_{X_1}^2 = \frac{\sum_{i=1}^{6}(X_1 - \bar{X}_1)^2}{n}$$

$$S_{X_2}^2 = \frac{\sum_{i=1}^{6}(X_2 - \bar{X}_2)^2}{n}$$

For this example:

$$t = 2.487221$$

The degrees of freedom:

$$k = 10 + 11 - 2 = 19$$

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

2.0930– for p=0.95

$t = 2.487221 > 2.0930$

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