WILLIAM D. LAW, JR. LEARNING COMMONS

One-tailed Hypothesis Testing for Means

STA 2023 & 2122

In testing a Hypothesis concern with a Population Mean, there are FIVE steps:

1. Identifying the claim and Hypothesis.
2. Information and Test Statistics.
3. Finding P-value.
4. Interpreting Test results.
5. Writing the Conclusion.

1. - Identifying the Claim and creating the Null and Alternative Hypothesis. The Claim can be assigned to either of the hypothesis.

Example: You are quality control personnel for a company of light bulb. You want to test at the 5% significance level, the quality report's claim that his light bulbs last more than 850 hours. You test 47 bulbs and find that the sample mean is 865 hours and a sample standard deviation 67 hours.

What is the Hypothesis?

H_0 is the Null Hypothesis H_1 is the Alternative Hypothesis.

H_0: μ=850 hours, note that the Null Hypothesis will always contain the equality sign.

H_1: μ>850 hours; this will be the claim of the quality control personnel. Light bulbs last more than 850 hours. [Right tail test]

2. - Identifying your information and find Test Statistics.

From the example of the light bulbs we have:

Population mean: μ =850 hours. Sample size: n=47 light bulbs. am l m a 65 hours.

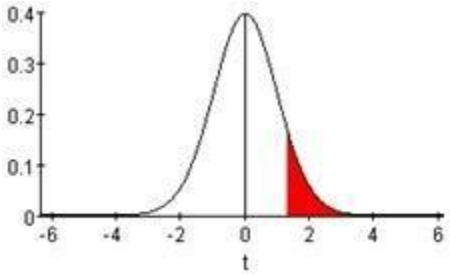
Sample standard deviation: S= 67 hours. Significance level: 5%= 0.05.

The use of the T distribution is recommended because there is not information about the Population Standard Deviation. The Test statistic will be:

$$t = \frac{\bar{x}-\mu}{S/\sqrt{n}} \quad t = \frac{865-850}{67/\sqrt{47}} \quad t = 1.5348$$

with n-1 degrees of freedom. n-1= 47-1 = 46 df.

3. - P-value, to find the P-value it is better to draw the T Distribution.



The Alternative Hypothesis was a one-tail test because the

Alternative Hypothesis is using the greater than symbol **">."** The Test Statistic is t=1.5348. The P-value is the area shaded in the right tail.

To find it we use **TCDF** function from the calculator.

2^{nd} > VARS > **4: TCDF** >ENTER> TCDF(Left Bound, Right Bound, Degrees of Freedom):

TCDF(1.5348, E99, 46): P-value = 0.065841.

4. – Interpreting the Test results. Compare the P-value with the Significance level, which is the α-value

The P-value for the Test Statistic is 0.065841, which is greater than the given significance level or 0.05.

This mean there is not enough evidence to reject the Null Hypothesis.

5. - Conclusions: This step is to write the decision in English, in the context of the problem. Remember to check the claim in both cases.

The light bulbs lasted more than 850 hours.therefore the claim is on the Alternative Hypothesis. There is not sufficient evidence to prove the quality report's claim that th light bulbs last mor tha

850 hours.

With the calculator:

Example: STAT > TESTS > 2: T-Test > ENTER

Inpt: Stats μ0:
850

65
Sx: 67
n: 47 μ:
>μ0

Calculate:

This is the Calculator output μ > 850 t= 1.5348

p=.065841

65
Sx= 63
n= 47

The **p** is our P-value. Now we will do step 5.

Write down our conclusion in English in the context of the problem.