Hypothesis Tests for a Population Mean

Requirements

- The sample is obtained using simple random sampling or from a randomized experiment.
- The sample has no outliers, and the population from which the sample is drawn is normally distributed or the sample size, n, is large ($n \geq 30$).
- The sampled values are independent of each other.

Classical Approach (TI-83/84)

1. Write down a shortened version of claim
2. Come up with null and alternate hypothesis (H_o always has the equals part on it)
3. See if claim matches H_o or H_1
4. Draw the picture and split α into tail(s)

   H_1: μ ≠ value   Two Tail

   H_1: μ < value   Left Tail

   H_1: μ > value   Right Tail
5. Find critical values (t-Distribution table)
6. Find test statistic (T-TEST)
7. If test statistic falls in tail, Reject H_o. If test statistic falls in main body, Accept H_o. Determine the claim based on step 3

Classical Approach (By Hand)

1. Write down a shortened version of claim
2. Come up with null and alternate hypothesis (H_o always has the equals part on it)
3. See if claim matches H_o or H_1
4. Draw the picture and split α into tails

   H_1: μ ≠ value   Two Tail

   H_1: μ < value   Left Tail

   H_1: μ > value   Right Tail

Classical Approach (By Hand) (cont.)

5. Find critical values: Use t-Distribution table
6. Find test statistic: $t_o = \frac{\bar{x}-\mu_o}{\frac{s}{\sqrt{n}}}$
7. If test statistic falls in tail, Reject H_o. If test statistic falls in main body, Accept H_o. Determine the claim based on step 3

P-Value Approach (TI-83/84)

1. Write down a shortened version of claim
2. Come up with null and alternate hypothesis (H_o always has the equals part on it)
3. See if claim matches H_o or H_1
4. Find p-value (T-TEST)
5. If p-value is less than α, Reject H_o. If p-value is greater than α, Accept H_o. Determine the claim based on step 3

P-Value Approach (By Hand)

1. Write down a shortened version of claim
2. Come up with null and alternate hypothesis (H_o always has the equals part on it)
3. See if claim matches H_o or H_1
4. Find test statistic: $t_o = \frac{\bar{x}-\mu_o}{\frac{s}{\sqrt{n}}}$

P-Value Approach (By Hand) (cont.)

5. Lookup the t-score from step 4 in the t-Distribution table and find the p-value (Remember the p value is the area JUST in the tail(s))
6. If p-value is less than α, Reject H_o. If p-value is greater than α, Accept H_o. Determine the claim based on step 3

Note

Practical significance refers to the idea that, while small differences between the statistic and parameter stated in the null hypothesis are statistically significant, the difference may not be large enough to cause concern or be considered important.

1. Claim

The mean amount of fluid in a bottle of Lens Cleaner is 59 mL. A researcher believes that the mean is actually lower than that. 15 bottles are sampled and the mean is found to be 58 mL with a standard deviation of 1.2 mL. Test the claim based on this information at $\alpha = 0.05$. Assume it is normally distributed.

2. Claim

The mean amount of fluid in a bottle of Lens Cleaner is 59 mL. A researcher believes that the mean is different than that. 35 bottles are sampled and the mean is found to be 63 mL with a standard deviation of 2.3 mL. Test the claim based on this information at $\alpha = 0.01$

Assume it is normally distributed.

3. Claim

The mean amount of fluid in a bottle of pop is 16.9 fl. oz. A researcher believes that the mean is more than that. 10 bottles are sampled resulting in the following data:

16	16.1	17	17.5	17.2
17	17.5	16.3	16.7	18.7

Test the claim based on this information at α = 0.10. Assume it is normally distributed.