

Testing a Claim Regarding a Population Mean

Step 0: Verify Assumptions

The hypothesis test has two assumptions

- The sample is obtained using simple random sampling
- The sample has no outliers and the population from which the sample is drawn is normally distributed or the sample size, n , is large ($n \geq 30$).

Step 1: State the Hypothesis

The hypothesis is a claim made regarding a population parameter

- In this course it will be a claim about the mean μ - but it could be any parameter
- Determine the null and alternative hypotheses.

Two-Tailed	Left-Tailed	Right-Tailed
$H_0: \mu = \mu_0$	$H_0: \mu = \mu_0$	$H_0: \mu = \mu_0$
$H_1: \mu \neq \mu_0$	$H_1: \mu < \mu_0$	$H_1: \mu > \mu_0$

Note: Some books use $H_0: \mu \geq \mu_0, H_0: \mu \leq \mu_0$ instead of $H_0: \mu = \mu_0, H_0: \mu = \mu_0$

Step 2: Select a Level of Significance α , the Critical Value(s), and the critical region

- Select α based on the seriousness of making a Type I error, typical values are 0.01, 0.05, or 0.10. You should also know β , the type 2 error, and the relation of β to α .
- Find the Critical Value(s) using α
- Draw the diagram and shade the critical region (where you will be rejecting the null hypothesis)

Step 3: Calculate the Test Statistic

The number of standard deviations the sample mean is from the claimed population mean, μ_0 .

- When σ is known, then a z -value may be found.
- When σ is unknown, then a t -value must be found.

Step 4: Make a Decision about the Null Hypothesis

- Reject the null hypothesis** if the test statistics lies in the critical region (classical method) or the probability associated with the test statistic is less than the level of significance (p-value method)
- Do not reject the null hypothesis** if the test statistic does not lie in the critical region or the probability associated with the test statistic is greater than or equal to the level of significance.

Step 5: State the Conclusion of the hypothesis test based on the decision with respect to the original claim.

a. Original Claim is H_0

Reject H_0 There is sufficient evidence (at the α level) to reject the claim that

Do Not Reject H_0 There is not sufficient evidence (at the α level) to reject the claim that

b. Original Claim is H_1

Reject H_0 There is sufficient evidence (at the α level) to support the claim that

Do Not Reject H_0 There is not sufficient evidence (at the α level) to support the claim that