

T – DISTRIBUTION: HYPOTHESIS TESTING

The goal of hypothesis testing is to assess the evidence provided by the data in favor of some claim about your population.

There are 5 general steps in hypothesis testing:

- 1) State the null (H_0) and alternative (H_a) hypotheses
- 2) Choose your level of significance (α). This is usually 0.05 unless stated otherwise.
- 3) Find your critical values. This is either **Z** or **t**.
 - Use Z if number of observations (n) $>$ 30 and if population standard deviation (σ) is known. Z critical value for α 0.05 = 1.96
 - Use t if $n <$ 30 and if σ is not known. Critical value is obtained from the t-table.
- 4) Calculate your test statistic (either Z or t)
 $Z = (\bar{X} - \mu) / (\sigma / \sqrt{n})$ or $t = (\bar{X} - \mu) / (s / \sqrt{n})$
- 5) Draw your conclusion. If test statistic $>$ critical value, reject the null hypothesis. If test statistic $<$ critical value then accept or fail to reject the null hypothesis.

Examples

- 1) The average IQ for a population of students at university A is 100 with a standard deviation of 15. As a statistician, you believe this value has changed. You decide to test 75 students. The average IQ of your sample is 105. Is there enough evidence to suggest the average IQ has changed?
- 2) At university B, the average IQ for a population of students is also 100. You believe this might not be the case. You pick a random sample of 5 students and record the following IQ scores: 119, 100, 125, 89, 70
Is there enough evidence to suggest the average IQ has changed?

