

11.7: Steps in Hypothesis Testing

Learning Objectives

- Be able to state the null hypothesis for both one-tailed and two-tailed tests
- Differentiate between a significance level and a probability level
- State the four steps involved in significance testing

1. The first step is to specify the null hypothesis. For a two-tailed test, the null hypothesis is typically that a parameter equals zero although there are exceptions. A typical null hypothesis is $\mu_1 - \mu_2 = 0$ which is equivalent to $\mu_1 = \mu_2$. For a one-tailed test, the null hypothesis is either that a parameter is greater than or equal to zero or that a parameter is less than or equal to zero. If the prediction is that μ_1 is larger than μ_2 , then the null hypothesis (the reverse of the prediction) is $\mu_1 - \mu_2 \geq 0$. This is equivalent to $\mu_1 \leq \mu_2$.
2. The second step is to specify the α level which is also known as the significance level. Typical values are 0.05 and 0.01.
3. The third step is to compute the probability value (also known as the p value). This is the probability of obtaining a sample statistic as different or more different from the parameter specified in the null hypothesis given that the null hypothesis is true.
4. Finally, compare the probability value with the α level. If the probability value is lower then you reject the null hypothesis. Keep in mind that rejecting the null hypothesis is not an all-or-none decision. The lower the probability value, the more confidence you can have that the null hypothesis is false. However, if your probability value is higher than the conventional α level of 0.05, most scientists will consider your findings inconclusive. Failure to reject the null hypothesis does not constitute support for the null hypothesis. It just means you do not have sufficiently strong data to reject it.

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