Hypothesis Testing

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The first of these is the question of how to estimate the parameters of a population using random samples.

The second fundamental problem is the question of how to refute or support claims made about the characteristics of a population or populations.

Hypothesis Testing

Example: Suppose a clinical trial is conducted on a drug to prevent the common cold. In the context of the trial itself, the hypothesis might be stated as:

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The hypothesis testing problem is concerned with deciding whether the experimental data supports or refutes this claim.

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- Evidence in the form of sample data is collected to test the claim
- The data are analyzed to support or refute the claim.

Hypothesis Testing Terminology

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Definition: A **hypothesis testing** is a procedure, based on sample evidence and probability, used to test claims about a characteristic of one or more populations.statement or claim regarding a characteristic of one or more populations.

Hypothesis Testing Terminology

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Definition: A **alternative hypothesis**, denoted H_1, is another claim to be tested.

In the experiment, we try to find evidence that the alternative hypothesis is true.

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In the clinical trial example presented earlier, the null hypothesis might be stated as:

People who receive drug X are not less likely to catch cold than people who do not.

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The alternative hypothesis might be stated as:

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- We reject H_0 when H_1 is true
- We do not reject H_0 when H_0 is actually true
- We reject H_0 when it is true; This is called **Type I error**
- We do not reject H_0 when H_1 is true. This is called **Type II error**

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The power of the test is simply the probability of correctly rejecting the null hypothesis H_0.