**Hypothesis Testing of µ**

**In statistics, a hypothesis is a claim or statement about a population parameter.**

**Example – the mean mass of a bag of chips is 43g.**

**A hypothesis test (or test of significance) is a standard procedure for testing a claim about a property of a population.**

**Hypothesis testing is based on the following principle:**

**If, under a given assumption, the probability of a particular observed event is exceptionally small, we conclude that the assumption is probably not correct.**

**We will do a few examples of formal hypothesis tests and along the way we will learn technique and terminology.**

**Traditional Method for μ (two-tailed)**

1. **Assume that the amount of time it takes to send a 10 Mb file across a network is normally distributed. At ∝ = 0.05 test the claim that the mean length of time to transfer a 10 Mb file across a network is 12.44 seconds by sending a 10 Mb file across a network at 20 random times, finding a mean of 13.22 seconds and a standard deviation of 2.65 seconds.**

**Step 1: We begin a hypothesis test by stating the claim that is being tested. The claim is a statement about a population parameter – in this case, \_\_\_\_\_\_.  
  
  
  
  
  
  
  
  
  
Step 2: Find the *test statistic*, ttest. This measures how many standard deviations our sample statistic is from the claimed value of the population parameter, assuming our claim is correct.**

**Step 3. Using the t-table, find tα/2. This gives us the boundary between the sample statistics that would lead us to reject the claim, and the sample statistics that would lead us not to reject it.  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
Step 4. Draw a conclusion.**

**Traditional Method for μ (right-tailed)**

1. **Assume that the amount of time it takes to send a 10 Mb file across a network is normally distributed. At** ∝ **= 0.05 test the claim that the mean length of time to transfer a 10 Mb file across a network is greater than 12.44 seconds by sending a 10 Mb file across a network at 131 random times, finding a mean of 13.22 seconds. Assume a population standard deviation of 2.65 seconds.**

**Traditional Method for μ (right-tailed)**

1. **At** ∝ **= 0.05 test the claim that the mean length of time to transfer a 10 Mb file across a network is greater than 12.44 seconds by sending a 10 Mb file across a network 20 times, finding a mean of 13.22 seconds and a standard deviation of 2.65 seconds.**

**P-value Method for μ (right-tailed)**

**The p-value is the probability of obtaining a value for the test statistic that is as extreme or more extreme than the value observed.**

1. **At ∝ = 0.05 test the claim that the mean length of time to transfer a 10 Mb file across a network is greater than 12.44 seconds by sending a 10 Mb file across a network 131 times, finding a mean of 13.22 seconds. Assume a population standard deviation of 2.65 seconds.**

**What if we’re wrong? Possible Errors in Hypothesis Testing – Type I and Type II**

**Type I Error - the mistake of rejecting the null hypothesis when it is actually true.**

**Type II Error - The mistake of failing to reject the null hypothesis when it is actually false.**

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**accepting**

* **It is often up to the individual testing the claim to select an appropriate significance level α, which is the probability of a type I error**

**How can we reduce the probability of making a Type I error?**

**How can we reduce the probability of making a Type II error?**