Outline

Setting: a population, a single variable, and an unknown parameter (for now, μ)
Assumptions: population normally distributed, sample a SRS, (σ known, temporarily)

1. The null hypothesis says that μ has some fixed value: \( H_0: \mu = \mu_0 \).

2. Decide on an alternate hypothesis.
   (a) Two-sided: \( H_a: \mu \neq \mu_0 \)
   (b) One-sided: \( H_a: \mu < \mu_0 \) or \( H_a: \mu > \mu_0 \)

   Often the alternate hypothesis is what we want to prove.

3. Decide on a “test statistic.”
   \[ z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \]

4. \( P \)-value: the probability that, if \( H_0 \) is true, we would see a value of the test statistic at least as extreme as the one that we got. If \( H_0 \) is true, \( z \) has a standard normal distribution.

   Low \( P \)-values are strong evidence against the null hypothesis

   That is low \( P \)-values are strong evidence that the mean is different from \( \mu \). It doesn’t mean that a low \( P \)-value is evidence of a large difference.

5. If \( \sigma \) is not known, the test statistic is
   \[ t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \]

   If \( H_0 \) is true, \( z \) has a \( t \) distribution with \( n - 1 \) degrees of freedom.
Test 2 Study Guide

1. The test covers Chapter 6 (lightly), Chapter 12, Chapter 11 (very important), Chapter 14, and the confidence interval portion of Chapter 18.

2. The “outlines” covered are all those from February 19 (outline 11) through March 6 (outline 19).

3. The second and third test from last semester are available on the course webpage. This test covers all the material of that second test together with confidence intervals for $\mu$ which were covered on the third test.

4. The most important chapter is Chapter 11. In particular
   
   (a) Understand the idea of a population - both a real finite population and an infinite, theoretical population
   
   (b) Know our favorite parameters by name and symbol ($\mu$ and $p$)
   
   (c) Understand the process of taking a sample (SRS)
   
   (d) Know our favorite statistics ($\bar{x}$ and $\hat{p}$) and what their properties are supposed to be

5. In terms of computation, the two most important kinds of computational problems were those involving the properties of the distribution of the sample mean (like Problem 11.36) and those in which we constructed a confidence interval for $\mu$ using the $t$-distribution (Table C).