Comparing Two Means

Comparing_Two_Means.tns

Name ______________________

Class ______________________

Background

Conditions for comparing two means:

- Both samples are simple random samples and both are independent of each other.
- Both samples come from populations that are normally distributed AND/OR both sample sizes are large (greater than 30).

The appropriate statistic is called the **two-sample *t*-statistic**:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad \text{where} \quad \begin{cases} \bar{x} \text{ is the sample mean} \\ s \text{ is the sample standard deviation} \\ n \text{ is the sample size} \\ \mu \text{ is the population mean (unknown)} \end{cases}$$

The degrees of freedom is the smaller of $n_1 - 1$ and $n_2 - 1$. When μ is unknown for the samples, it is assumed that $\mu_1 = \mu_2$.

The procedure for comparing two means is similar to other inference testing. We will use this procedure as we investigate the following example.

Problem 1 – Testing Volumes of Cans

Read the problem on page 1.2.

1. What are the null hypothesis and the alternative hypothesis?

2. Calculate the test statistic. (Verify that the conditions needed for the test are met.)

3. Is the test one-tailed or two-tailed? Explain your reasoning.

4. Find the critical value(s) for the given significance level and graph the critical region.

5. Should the null hypothesis be rejected or fail to be rejected? Explain your reasoning.

6. State your conclusion.

Problem 2 – Homework

The spreadsheet on page 2.2 contains a simple random sample of basketball players from East and West divisions. The field goal percentage for each player in the sample is given. Determine if the mean percentages of the East and West divisions are significantly different. Use a significance level of $\alpha = 0.10$.

Remember, you must verify that the sample is normal to use the two-sample *t*-distribution.