AP STAT   Handout: 2-Sample Means   Name _____

Ch 13.1: Comparing Two Population Means

EQ: What is the difference between comparing 1-sample means and comparing 2-sample means?

 GOAL:
   • compare the responses or the characteristics of _____

 SAMPLE:
   • have a representative _____ _____ from _____
     _____

 RESPONSES:
   • _____ from other group

 CONDITIONS:
   • **Random: SRS** from two _____ _____ measuring

     _____   _____

   • **Independence** --- _____ > 10(_____)   _____ > 10(_____)

   • **Large Counts** ---

   ❖ Difference of Sample means = _____

   ❖ Standard error of Difference of sample means = _____

   ➢ **Hypothesis Test: 2-Sample t-test for Means**

$$P\left(t \underline{\quad\quad} \frac{(\underline{\quad} - \underline{\quad}) - 0}{\sqrt{\underline{\quad} + \underline{\quad}}} \right)$$

Ex 1. Do boys have better short term memory than girls? A simple random sample of 200 boys and a simple random sample of 150 girls was administered a short term memory test. The average score for boys was 48.9 with standard deviation 12.96. The girls had an average score of 48.4 with standard deviation 11.85. Is there significance evidence at the 5% level to suggest boys have better short term memory than girls? Note: higher test scores indicate better short term memory.

▪ **State:**

H_0 : the true population mean _____ for boys and true population mean _____ girls is the _____.

H_a : the true population mean _____ for _____ is _____ than the true population mean _____ for _____

H_0: _____ = _____   or   you can write   _____ = __

H_a: _____ > _____   or   you can write   _____ > __

Where: μ_B = _____
_____
μ_G = _____
_____

▪ **Plan:**   _____-Sample _____-test for _____

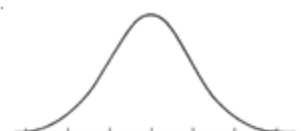Conditions: Boys   Girls

Random:

Independence:

Large Counts:

▪ **Do:**

n_B = _____ $\overline{x}_B$ = ____ s_B = _____ n_G = _____ $\overline{x}_G$ = ____ s_G = _____   df = _____ a = _____

P (_____ > _____) = P (_____ > _____) = _____

- Since our *p*-value of _____ is _____ than our significance level _____, we have evidence

  to _____ the null. We _____ evidence to conclude it is **plausible**

  that the true population mean _____ for _____ is

  _____ than the true population mean _____ for

  _____ on a short term memory. Our data _____ statistically significant.

*** NOTE: The conclusion must be written in context of the _____hypothesis.

Ex.2 We want to test the effect of high-protein diets on weight gain. A simple random sample of
      12 juvenile rats are fed a high protein diet and their weight gains are given by
                134 146 114 119 124 161 107 93 113 129 97 123

As a comparison, another simple random sample of 12 rats are given a regular (lower protein) diet.
Their weight gains are   **70 105 95 118 101 85 107 132 94 88 112 97**

Determine if there is significant evidence that the rats fed a high protein diet gain more weight.

- State: H_0 : the true population mean _____ for rats fed a _____
            diet and true population mean _____ rats fed a _____
            diet is the _____

        H_a : the true population mean _____ for rats fed a _____
            diet is _____ than true population mean _____ rats
            fed a _____ diet

     H_0: _____ = _____   or   you can write   _____ = __

     H_a: _____ > _____   or   you can write   _____ > ___

Where μ_{HP} = _____

          _____

      μ_{LP} = _____

          _____

- **Plan:**   _____-Sample _____-test for _____

Conditions: _____ Rats fed HP Diet _____ Rats fed LP diet _____

Random:

Independence:

Large Counts:

- **Do:**

  n_{HP} = _____ $\bar{x}_{HP}$ = ____ s_{HP} = _____ n_{LP} = _____ $\bar{x}_{LP}$ = ____ s_{LP} = _____ df = ___ α = ___
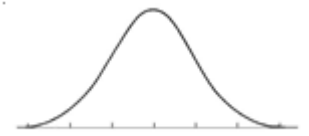
  P (_____ > _____) = P (_____ > _____) = _____

- Since our *p*-value of _____ is _____ than our significance level _____, we have evidence to _____ the null. We _____ evidence to conclude it is **plausible** the true population mean _____ for rats fed a _____ diet is _____ than true population mean _____ rats fed a _____ diet. Our data _____ statistically significant.

*** NOTE: The conclusion must be written in context of the _____hypothesis.

❖ **Assignment:** p. 791 #10; p. 801 #13(just run once); p. 804 #19(a); Practice Worksheet #6