

**AP Statistics**  
**Chapter 10:**  
**Comparing Two Populations or Groups**  
**Day 5**  
**HW: Lesson 5 Practice Worksheet**

July	90	\$2.95	\$0.22
September	45	\$3.61	\$0.19

Construct and interpret a 99% confidence interval for the difference in the mean wheat price in July and in September.

$\mu_1$  = The average price of wheat in July  
 $\mu_2$  = The average price of wheat in September.

conditions

- ① As stated, this is an SRS.
- ② There were at least 900 wheat producers in July and 450 wheat producers in September.
- ③ Since  $n \geq 30$  for both variables, we can assume the data is approx. normal.

$\mu_1$  = July                       $\mu_2$  = September

$\bar{x}$  =                                       $\bar{x}$  =                      using my calculator, I performed a 2-sample T-interval.

$s\bar{x}$  =                                       $s\bar{x}$  =                      (-.7561, -.5639)

$n$  = 90                                       $n$  = 45

$df$  = 89                                       $df$  = 44

We are 99% confident that the true difference in the mean price of wheat in July and September falls between -.7561 and -.5639. This suggests that the mean price of wheat in July was cheaper than in September.

**Significance Tests for  $\mu_1 - \mu_2$**

The null hypothesis has the general form:

$H_0: \mu_1 - \mu_2 = 0$

\*  $H_0: \mu_1 = \mu_2$

The alternative hypothesis says what kind of difference we expect.

**Example**

Does increasing the amount of calcium in our diet reduce blood pressure? Examination of a large sample of people revealed a relationship between calcium intake and blood pressure. The relationship was strongest for black men. Such observational studies do not establish causation. Researchers therefore designed a randomized comparative experiment. The subjects were 21 healthy black men who volunteered to take part in the experiment. They were randomly assigned to two groups: 10 of the men received a calcium supplement for 12 weeks, while the control group of 11 men received a placebo pill that looked identical. The experiment was double-blind. The response variable is the decrease in systolic (top number) blood pressure for a subject after 12 weeks, in millimeters of mercury.

An increase appears as a negative response. Here are the data:

Group 1 (calcium): 7 -4 18 17 -3 -5 1 10 11 -2  
Group 2 (placebo): -1 12 -1 -3 3 -5 5 2 -11 -1 -3

Do the data provide sufficient evidence to conclude that a calcium supplement reduces blood pressure more than a placebo? Carry out an appropriate test to support your answer.

$\mu_1$  = The average blood pressure of a male who took the calcium pill.  
 $\mu_2$  = The average blood pressure of a male who took the placebo pill.

It is a 2-sample T-test on my calculator.

$$H_0: \mu_1 = \mu_2 \quad H_a: \mu_1 > \mu_2$$

$$\begin{aligned} \mu_1 &= & \mu_2 &= \\ \bar{x}_1 &= 5 & \bar{x}_2 &= -2.727 \\ Sx_1 &= 8.743 & Sx_2 &= 5.901 \\ n_1 &= 10 & n_2 &= 11 \end{aligned}$$

Since the p-value is .064 and is greater than the significance level of  $\alpha = .05$ , we fail to reject  $H_0$ . There is not sufficient evidence that taking a calcium pill will reduce blood pressure.

$$df = 15.9 \quad t = 1.604 \quad P\text{-value} = .064$$