MATH 160 Chapter 9 KEY

PROBLEM 1

The Monroe Medical Group studied the ailments of adults with diabetes. Of 8750 adults who are diabetic, 2100 have high cholesterol. Of 12350 adults who are not diabetic, 1482 have high cholesterol. Find the percentage of adults with high cholesterol for both groups.

Diabetic: $n_1 = 8750,\ x_1 = 2100,\ \hat{p}_1 = ?$

Not Diabetic: $n_2 = 12350,\ x_2 = 1482,\ \hat{p}_2 = ?$

Construct a 99% confidence interval for the difference between the two population proportions of adults with and without diabetes who have high cholesterol. (write your answer as a percentage then round to the tenths place)

ANSWER: $10.6\% < P_1 - P_2 < 13.4\%$ using the 2PropZinterval command on the Calculator

Is there a significant difference between the two groups? Do diabetics have high cholesterol when compared to non diabetics? **Explain your answer by using the confidence interval from above.**

Yes, there is a significance difference between the two groups because zero is not included in the confidence interval.

$P_1 - P_2 \neq 0$ therefore $P_1 \neq P_2$

PROBLEM 2

A study was conducted to determine whether magnets are effective at treating back pain. One group was given the magnet treatment, while the other group was given the sham treatment. The results are shown below where measurements are centimeters on a pain scale. Do not assume the population standard deviations are equal.

Magnet:

$n_1 = 23,\ \bar{x}_1 = 0.47,\ s_1 = 0.95$

Sham: (similar to a placebo)

$n_2 = 25,\ \bar{x}_2 = 0.32,\ s_2 = 1.45$

Construct a 95% confidence interval for the difference between the two population means. Round to the thousandths place.

Answer: $-.559 < \mu_1 - \mu_2 < .859$ Using the 2Sample T-Interval (not pooled)

Based on the results, does it appear that the two populations have different means? EXPLAIN your answer using the interval from the previous answer.

The two populations have the same mean since zero is included in the confidence interval. One treatment does not appear to be better than the other.

$\mu_1 - \mu_2 = 0$ therefore $\mu_1 = \mu_2$

PROBLEM 3

A study was conducted to determine whether listening to Mozart improves scores on a math quiz. A random sample of five students took math quizzes, first before and then after listening to Mozart. The results are shown below. Construct a 99% confidence interval for the mean difference.

Before	75	50	80	85	95
After	85	45	85	95	95

Answer: $17.38 < \mu_d < 9.38$ Using the formula

You may get a slightly different answer if you are using the T-test command on your calculator.

Based on the results, does it appear that listening to Mozart improves scores on a math quiz? EXPLAIN your answer using the confidence interval from above.

Since zero is included in the interval, the mean difference can equal zero which means no change in scores. Listening to Mozart does not seem to improve test scores.

PROBLEM 4

A nutritionist claims that a particular exercise program will help participants lose weight after one month. The table shows the weights of 6 adults before the exercise program and after the exercise program. At a 0.10 significance level, can you conclude that the exercise program helps participants lose weight? Test the claim that the exercise program helps participants lose weight.

Before program	157	165	150	251	140	137
After program	150	169	150	232	138	145

Is this particular exercise program effective in helping participants lose weight after just one month ?

$H_0 : \mu_d = 0$

$H_1 : \mu_d > 0$

$T.S.\ \ t = .688$

$P - value = .2612$

There is not sufficient evidence to support the claim that the exercise program helps participants loose weight.

PROBLEM 5

Among 2600 randomly selected male car occupants over the age of 8, 78% wear seatbelts. Among 2500 randomly selected female car occupants over the age of 8, 84% wear seatbelts. Use a 0.05 significance level to test the claim that both genders have the same rate of seatbelt use. Does there appear to be a gender gap?

$H_0 : P_1 = P_2$

$H_1 : P_1 \neq P_2$

$T.S.\ \ z = -5.45$

$P - value = .0002$

or .0000000495

There is sufficient evidence to warrant rejection of the claim that both genders have the same rate of seatbelt use.

PROBLEM 6

Using the data below and a 0.05 significance level, test the claim that the mean amount of tar in filtered cigarettes is less than the mean amount of tar in unfiltered cigarettes. Do not assume the population standard deviations are equal. All measurements are in milligrams.

Filltered	18	16	17	14	16	3	17	18	9
Unfiltered	19	21	22	26	23	25	19		

Is there sufficient evidence to support the claim that the mean amount of tar in filtered cigarettes is less than the mean amount of tar in unfiltered cigarettes?

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 < \mu_2$

$T.S.\ \ t = -4.013$

$P - value = .000764$

Using 2 sample T-Test

The sample data supports the claim that the mean amount of tar in filtered cigarettes is less than the mean amount of tar in unfiltered cigarettes.