Name _____ **Date** _____

Confidence Intervals for Means of Two Large Independent Samples

Kathleen Mittag

CALCULATORS: Casio: *fx-9750G Plus* • Casio: *CFX-9850G Series*

Student Worksheet

Confidence Interval is an interval of values computed from sample data that is likely to include the true population value.

If we consider all possible randomly selected samples of the same size from a population, the confidence level is the fraction or percent of those samples for which the confidence interval includes the population parameter. Common confidence levels are 80%, 90%, 95% and 99%.

Problems:

Every year you do an activity using plain M&M candies. You are interested in determining of the mean weight of the candies changes from one year to the next. The first year you sampled 100 M&M candies and found that the mean weight was 0.9147 grams and the standard deviation was 0.0369 grams. The next year you sampled 100 M&M candies and found that the mean weight was 0.9160 grams and the standard deviation was 0.0433 grams. Is the difference between the two sample means significant?

1. Let's look at how the confidence intervals change width for the same sample data as the confidence level changes. Use the M&M data sets.

a) Calculate the 80% confidence interval. _____

b) Calculate the 90% confidence interval. _____

c) Calculate the 95% confidence interval. _____

d) Calculate the 99% confidence interval. _____

e) What is happening to the widths of the intervals as the confidence level increases? Why do you think this is occurring?

_____

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2. Do you think there is a difference between the sample means? Explain your answer.

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Keystrokes and Answers

Using the Calculator

- In the main menu, press **2(STAT)** .
- Press **F4(INTR)** . (It does not matter if data is in lists.)
- Press **F1(Z)** .
- Press **F2(2-S)** .
- Choose **Var** for Data.
- Enter the confidence level, .8 for 80%.
- Enter the standard deviations, means and sample sizes for the two samples of M&Ms.
- With **Execute** highlighted, press **F1(CALC)**.
- The answer will appear.

Answers:

1. **a)** $-.00859 < (\mu 1 - \mu 2) < .00599$
This interval contains zero so it is likely that the two population means are equal.

b) $-.010657 < (\mu 1 - \mu 2) < .0080576$
This interval contains zero so it is likely that the two population means are equal.

c) $-.01245 < (\mu 1 - \mu 2) < .0098502$
This interval contains zero so it is likely that the two population means are equal.

d) $-.015953 < (\mu 1 - \mu 2) < .013353$
This interval contains zero so it is likely that the two population means are equal.

e) The intervals get wider as the confidence level gets more accurate. This makes sense since as you get more precise the interval will be wider because of sampling error.

2. There confidence intervals indicate that there is likely no difference between the sample means.

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