**Class Activity – Lesson 06** **Great Penny Experiment**

**Complete Part A at home, and bring this worksheet (together with your 50 pennies and 1 nickel) to class. You will complete Part B in class. You will complete Part C after class. You must fully participate in the Great Penny Experiment to get these points, and this assignment will eventually be submitted in Brain Honey.**

Part A: This part of the worksheet should be completed **prior to coming to class** with your 50 pennies and 1 nickel. Use your data to answer the **three** questions in Part A.

1. (4 points) Record in SPSS the year each of your pennies was minted. Then, calculate the age of each of your pennies.

To calculate the age in years, Use Transform->Compute Variable in SPSS, and subtract the date stamped on each penny from 2013. To do this:

1. In the Compute Variable window, type in *Age* in the Target Variable box.
2. Then in the Numeric Expression box, type in *2013-*.
3. Then in the box below the Target Variable box, click on the name of the variable that has column of years listed for each of your pennies (usually, the name of the variable is VAR0001 unless you changed the name).
4. Click on the arrow next to the Numeric Expression box. This will move the highlighted variable to the Numeric Expression box and it will be after *2013-*.
5. Then, click on [OK].

Report the mean and standard deviation of your pennies’ ages to the nearest hundredth (2 decimal places).

Mean = **answers will vary** Standard Deviation = **answers will vary**

2. (1 point) Use SPSS to make a histogram illustrating the distribution of the ages of your pennies.

**answers will vary**

**Affix your SPSS graph** on the next page. By hand, write an “×” on the horizontal axis of your histogram to indicate the location of your sample mean.

­­

3. (1 point) Based on your sample, how would you describe the shape of the distribution

of circulating pennies’ ages?

**answers will vary**

Part B: This part of the worksheet will be completed in class. You will use *the combined data from the class* to answer the following questions.

4. Answer the following questions in class. Use complete sentences.

1. (1 point) Let X be a random variable representing the ages of the pennies. Describe the shape of the distribution of X.

**For most, it will be right skewed**

1. (1 point) Let be a random variable representing the sample means. Describe the shape of the distribution of

**Approximately Normal**

Everyone brought the same number of pennies. So, the mean of all students sample

means is the same as the mean age of all the pennies on the board. The same is not true

for the standard deviations.

1. (1 point) The mean ages of the pennies was entered on the instructor’s computer. Record the mean and standard deviation of the means. (In other words, record the mean and standard deviation of the distribution illustrated by the nickels.)

Mean()= **answers will vary** Std. Dev()= **answers will vary**

1. (1 point) Compare your sample mean from Question 1 to the grand mean for the entire class from Part (c) on this page. How close were these values?

**Should be fairly close(answers will vary)**

1. (1 point) Compare your sample standard deviation from Question 1 to the standard deviation of the means from Part (c) on this page. How do these values compare? Explain the results.

**Each students sample standard deviation should be much larger than the standard deviation in part (c)**

1. (1 point) Do you think the distribution of the mean age of a sample of pennies, will be approximately normal, no matter what sample size is chosen? Justify your answer.

**No, for the distribution of the nickels to be approximately normal, the sample size needs to be large.**

1. (1 point) What did the nickel represent?

**A sample mean**

1. (1 point) What did each student represent?

**A sample**

1. (1 point) When we calculate the standard deviation of the sampling distribution, the formula is . Referring to the Great Penny Experiment, is the sample size, n, the number of students who were in class or the number of pennies that each student brought to class?

**The sample size (n) is the number of pennies that each student brought to class.**

1. (1 point) List the major items you learned from the Great Penny Experiment.

**answers will vary but here is my list.**

1. **As the sample size gets larger, the distribution of sample means is approximately normal (the Central Limit Theorem).**
2. **The standard deviation of the sample means (the nickels) is much smaller than the standard deviation of the population (the pennies).**
3. **The mean of the sample means (the nickels) is equal to the mean of the population (the pennies).**