

MAT 103 -Final Project

Instructor: Samantha Fredericks

Student Name: _____

DUE DATE: Wednesday May 3rd at 11:59 pm via Blackboard Submission

GRADE: _____/100 pts

Instructions: Place 100 pennies in a bag, without looking pick a penny out and record the year on the penny. You will pick 10 times with replacement and then find the mean year of the 10 pennies. You will then repeat this process 30 times. The end result, is to record the mean year received from each of the 30 trials. Answer the questions below based on the data collected.

Part A

List your 30 sample means that make up your data set.

Part B

- Find the 5-number summary for your sample means (Minimum, 1st Quartile, Median, 3rd Quartile, and Maximum). Be sure to identify any outliers in your data. **If outliers are identified be sure to remove them from your data on all following questions and adjust your 5-number summary accordingly.**
- Create a box plot for your data. Comment on the shape of your box-plot. Does it appear to be relatively normal?

Part C

- Group your sample mean years into classes (Depending on your range, either a 5 or 10 year group may be best, use best judgement). Create a frequency table for the classes. Include a class boundary column as well (you will need this for your histogram).
- Use your frequency table to plot a histogram where the x-axis is your class boundaries and the y-axis is your frequency. Be sure to use appropriate axis and graph labels. Comment on the shape of the histogram, is it relatively normal?

Part D

- Compute the mean and standard deviation of all your sample means that make up your data set. (You may use the formulas given in the text or use a program on your calculator).
- Use Pearson coefficient of skewness formula $\left(PC = \frac{3(\bar{X} - \text{median})}{s} \right)$ to determine normality.

Part E

- a. Use the z-score $\left(\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}\right)$ to determine the probability of the having a sample mean greater than or equal to the year 2005. That is $P(X \geq 2005)$. **(SHOW WORK)**
- b. Either using the empirical rule or z-score, state the range in which 95% of your data will fall.

Part F

The average penny is said to last 15 years in circulation. Compute the age of each of your sample means. (Example: 2021- 1982 = 39 years). Using your computed ages, compute the mean and standard deviation. Then complete a hypothesis test to see if the age of an average penny is actually greater than 15 years. (Use a t-test for your test statistic.)