

Class Exercise 3

Instructions

- Deadline: **Monday, February 9 (5:30)pm**
- Please show all of your work on your submission. Notation counts. Poor notation will result in a loss of marks.
- Please leave your answers as exact values. If using decimals, please report your answer to four decimal places.
- You are encouraged to ask your instructor for help, and/or discuss ideas with your classmates. However, you must produce fully explained individual solutions.
- Under no circumstances may you simply copy solutions obtained online or from a classmate. In unclear cases, you may be asked to explain your solutions in a Teams meeting, and your work may be refused altogether.

1. Multiple Choice

For each question below, select **all** the statements that are **correct**. Each question has **at least one correct answer, but not necessarily all options are correct**. You will receive **full credit** if and only if you select all correct answers and **no incorrect answers**. Selecting an incorrect option or missing a correct option may result in **partial credit or no credit**.

- A. Which of the following statements about the **Empirical Rule** are true?
- The Empirical Rule applies only to distributions that are symmetric and unimodal.
 - If a data set follows the Empirical Rule, then roughly two-thirds of the data values are clustered close to the mean.
 - For an approximately normal distribution, about 95% of observations lie within two standard deviations of the mean.
 - Observations more than 3 standard deviations from the mean are impossible.
 - The Empirical Rule applies to all data sets, regardless of their shape.
- B. Which of the following statements about the **mean, median, and mode** and the **shape of a distribution** are true?
- In a left-skewed distribution, the mean is typically greater than the median.
 - In a perfectly symmetric distribution, the mean and median are equal.
 - In a right-skewed distribution, the mean is typically greater than the median.
 - If the mean is larger than the median, the distribution must be symmetric.
 - In a symmetric distribution with one peak, the mean, median, and mode are all equal.

- C. Which of the following statements about **measures of dispersion** are true?
- Adding the same constant to every data value changes the value of the standard deviation.
 - The range provides a reliable summary of variability for skewed distributions.
 - A data set with a larger standard deviation is necessarily more variable than a data set with a smaller standard deviation.
 - The variance is zero if and only if all data values are equal.
 - Multiplying every data value by a constant k multiplies the standard deviation by k .

2. Shampoo

Scented shampoo can sometimes make people feel that their hair is smoother and silkier than when using an unscented version. The table below shows the number of different hair products kept in the bathrooms of several people.

Number of Hair Products	Number of People
3	15
4	17
5	19
7	11
8	24

- Calculate the average (mean) number of hair products.
- Calculate the sample variance and the sample standard deviation. State the units for each.
- Multiply each data value, x_i , by 10 and recalculate the mean, sample variance, and sample standard deviation. How does multiplying every data value by 10 affect the mean, variance, and standard deviation?
- Use the LTCFs to estimate the value of P_{65}