Class Exercise 2

Instructions

- Deadline: **Monday, February 2 (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.

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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. Suppose the mean of a data set is μ.

      a. If every data value is multiplied by 10, the new mean is $10 + \mu$.
      b. If 7 is added to every data value, the new mean is $\mu + 7$.
      c. If every data value is divided by 2, the mean remains unchanged.
      d. If every data value is multiplied by 10 and then 7 is added, the new mean is $10\mu + 7$.

   B. Which of the following statements about the **mean, median, and mode** are true?

      a. Adding the same constant to every data value increases the mean, median, and mode by that constant.
      b. Multiplying every data value by a positive constant multiplies the mean and median by that constant.
      c. Adding a new data value that is much larger than the current mean will increase the mean.
      d. Adding a new data value equal to 0 will always decrease the mean.

C. Which of the following statements about a **weighted mean** are true?

a. If all weights are equal, the weighted mean reduces to the ordinary mean.

b. A value with zero weight affects the weighted mean.

c. Repeating a data value multiple times is equivalent to increasing its weight in a weighted mean.

d. Multiplying all weights by the same positive constant does not change the weighted mean.

2. **ChatGPT Wedding Vows**

Recently, a couple in the Netherlands has had their marriage invalidated in court after their officiant used ChatGPT to create their wedding vows, which neglected to include any legal declarations of marriage.

At a wedding registry office, officiants reviewed a sample of AI-generated wedding vows and recorded the number of legal declarations that were missing from each set of vows. The table below summarizes the results:

Number of Missing Legal Declarations	Number of Vows
0	6
1	8
2	22
3	38
4	56

(a) Calculate the average number of missing legal declarations per set of vows.

(b) What is the probability that a randomly selected set of vows is missing 2 or more legal declarations?

(c) Would a bar chart or a histogram be more appropriate for representing the number of omissions data? Explain your reasoning and describe the shape of the distribution.

The officiants were also asked how long they had been performing wedding ceremonies. Their responses are shown below:

Years of Experience	Number of Officiants
$[0, 5)$	30
$[5, 10)$	15
$[10, 15)$	11
$[15, 20)$	13
$[20, 25)$	20
$[25, 30)$	31

(d) Estimate the average number of years of experience for officiants in the study.

(e) Would a bar chart or a histogram be more appropriate for representing the years of experience data? Explain your reasoning and describe the shape of the distribution.