

Math 13 - Homework 3

Name: _____ Class Number: _____

1) About the Mode: indicate whether the following statements are True or False

- a. The mode is the most frequent value in a distribution.
- b. There cannot be more than one mode per distribution.
- c. The mode is influenced by extreme values.
- d. The mode's value can change by organizing the data into different categories.
- e. The mode is only applicable to qualitative variables.

2) About the Median: indicate whether the following statements are True or False

- a. The median is the central value with 50% of the values larger than it and 50% smaller.
- b. There can be more than one median per distribution.
- c. The median is affected by extreme values.
- d. The median's value is rather stable even when data are organized into different categories.
- e. The median is applicable to both qualitative and quantitative variables.

3) About the Average: indicate whether the following statements are True or False

- a. The average is the sum of all entries divided by half the number of entries.
- b. There is only one average per distribution.
- c. The average is not influenced by extreme values.
- d. The average is applicable to quantitative variables only.
- e. The average is always greater than the median.

4) True or False. If a distribution is skewed to the right,

- a. the mean is less than the median
- b. the mean and the median are equal
- c. the mean is greater than the median

5) Consider the numbers: 2, 3, 4, 5, 5.

- a. Compute the mode, median, and mean.
- b. If the numbers represent codes for the colors of T-shirts, which average(s) would make sense?
- c. If the numbers represent one-way mileages for trails to different lakes, which average(s) would make sense?
- d. Suppose the numbers represent survey responses from 1 to 5, with 1 = disagree strongly, 2 = disagree, 3 = agree, 4 = agree strongly, and 5 = agree very strongly. Which averages make sense?

6) A job-performance evaluation form has these categories: 1 = excellent; 2 = good; 3 = satisfactory; 4 = poor; 5 = unacceptable. Based on 15 client reviews, one employee had a median rating of 4, and a mode rating of 1. The employee was pleased that most clients had rated her as excellent. The supervisor said improvement was needed because at least half the clients had rated her at the poor or unacceptable level. Comment on the different perspectives.

7) In this problem, we explore the effect on the mean, median, and mode of adding the same number to each data value. Consider the data set 2, 2, 3, 6, 10.

- Compute the mode, median, and mean.
- Add 5 to each of the data values. Compute the mode, median, and mean.
- Compare the results of parts (a) and (b). In general, how do you think the mode, median, and mean are affected when the same constant is added to each data value in a set?

8) In this problem we explore the effect on the mean, median, and mode of multiplying each data value by the same number. Consider the data set 2, 2, 3, 6, 10.

- Compute the mode, median, and mean.
- Multiply each data value by 5. Compute the mode, median, and mean.
- Compare the results of parts (a) and (b). In general, how do you think the mode, median, and mean are affected when each data value in a set is multiplied by the same constant?

9) Consider a data set of 15 distinct measurements with mean A and median B .

- If the highest number were increased, what would be the effect on the median and mean? Explain.
- If the highest number were decreased to a value still larger than B , what would be the effect on the median and mean?
- If the highest number were decreased to a value smaller than B , what would be the effect on the median and mean?

10) Consider two data sets A and B . The set A has 5 values and a mean of 10. The set B has 50 values and a mean of 10.

- Suppose the number 20 is included as an additional data value in set A . Compute the mean for the new data set.
- Suppose the number 20 is included as an additional data value in set B . Compute the mean for the new data set.
- Why does the addition of the number 20 to each data set change the mean for set A more than it does for set B ?

11) The highway mileages of 13 compact cars are:

	model	mileage
1	Aston Martin Vanquish	19.00
2	Audi TT Coupe	29.00
3	BMW 325CI	27.00
4	BMW 330CI	28.00
5	BMW M3	23.00
6	Jaguar XK8	26.00
7	Jaguar XKR	23.00
8	Lexus SC 430	23.00
9	Mini Cooper	32.00
10	Mitsubishi Eclipse	31.00
11	Mitsubishi Spyder	29.00
12	Porsche Cabriolet	26.00
13	Porsche Turbo 911	22.00

- Calculate the median:
- Calculate the mode:
- Calculate the mean:
- Calculate the range:
- Calculate Q_1 (the 1st quartile)
- Calculate Q_3 (the 3rd quartile)
- Calculate the Interquartile Range (IQR):
- Calculate the Variance Range (Var):
- Calculate the Standard Deviation (SD):

12) A small accounting firm pays each of its five clerks \$35,000, two junior accountants \$80,000 each, and the firm's owner \$320,000.

- What is the mean salary paid at this firm?
- How many of the employees earn less than the mean?
- What is the median salary?

13) The firm in the previous question gives no raises to the clerks and junior accountants, while the owner's take increases to \$455,000.

- How does this change affect the mean?
- How does it affect the median?

14) In Chemistry 400, weights are assigned to required activities as follows:

- Class participation 15%
- Exam 1, 20%
- Exam 2, 20%
- Exam 3, 20%
- Laboratory 25%

Each activity is graded on a 100-point scale. Mary earned 70 points on class participation, 80 points on exam 1, 64 points on exam 2, 77 points on exam 3, and 96 points on laboratory. Compute her overall weighted average in the Chemistry 400 class.

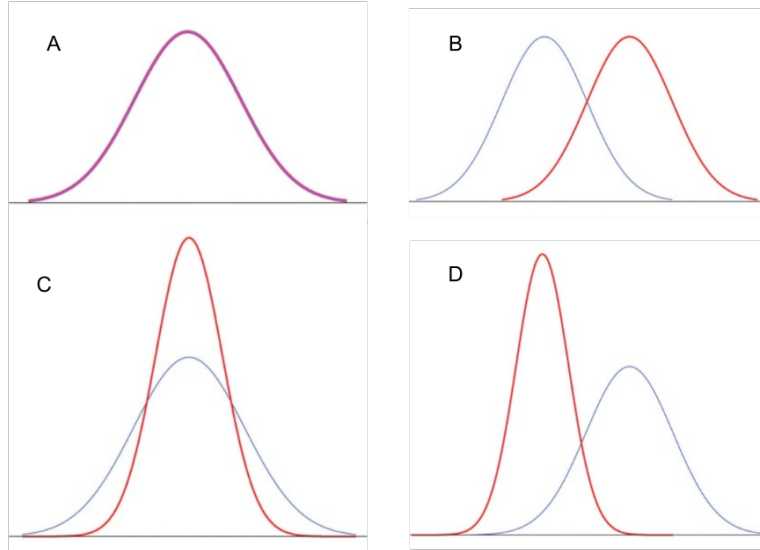
15) Three instructors are comparing scores on their finals: each had 99 students. In class A, one student got 1 point, another 99 points, and the rest got 50 points. In class B, 49 students got a score of 1, one student got a score of 50, and 49 students got a score of 99. In class C, one student got a score of 1, one student got a score of 2, one student got a score of 3, and so forth, all the way through 99.

- Which class had the biggest average? or are they the same?
- Which class had the biggest SD? or are they the same?
- Which class had the biggest range? or are they the same?

16) In the following situations, which do you think is a more informative statistic, the mean or the median?

- In order to decide whether to discontinue a bus service from Rochester to New York City, an executive studies the number of riders on a sample of days.
- To determine how present-day college-bound students compare with those of earlier years, a sample of entrance examination scores from several years is consulted.
- A lawyer representing a defendant in a jury trial is studying the IQ scores of the jurors who were selected.
- You purchased your home 6 years ago in a small suburban community for \$105,000, which was both the mean and the median price for all homes sold that year in that community. However, in the last couple of years some new, more expensive homes have been built. To get an idea of the present value of your home, you study recent sales prices of homes in your community.

17) Match the following figures with the corresponding descriptions:



- Centers differ.
- Centers and spread differ.
- Two identical distributions.
- Dispersions differ.