

QUIZ 1

(LESSONS 1-10: INTRO and DESCRIPTIVE STATISTICS)
 MATH 119 – FALL 2022 – KUNIYUKI
 100 POINTS TOTAL

No notes or books allowed. A scientific calculator is allowed. Simplify as appropriate.
 You do not have to reduce fractions. For example, 10/20 does not have to be rewritten as ½.

FORMULAS

$$\mu = \frac{\sum x}{N}$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum (x - \mu)^2}{N}$$

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

$$\sigma = \sqrt{\frac{\sum (x - \mu)^2}{N}}$$

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$\text{Median Position Number} = \frac{N + 1}{2}, \text{ or } \frac{n + 1}{2}$$

$$\text{Midrange} = \frac{\text{Min} + \text{Max}}{2}$$

$$\text{From a Frequency Table: Estimated Mean} = \frac{\text{Estimated Sum}}{N}, \text{ or } \frac{\sum f \cdot x}{\sum f}$$

$$\text{Weighted Mean} = \frac{\sum w \cdot x}{\sum w}$$

$$\text{Range} = \text{Max} - \text{Min}$$

$$z = \frac{x - \mu}{\sigma}, \text{ or } z = \frac{x - \bar{x}}{s}$$

$$\text{IQR} = Q_3 - Q_1$$

1) (3 points). A college has 500 classes. Seven classes are randomly selected. All the students in the seven classes take a survey. What sampling method is being used here? Box in the best answer:

- simple random sampling
- systematic sampling
- cluster sampling
- stratified sampling

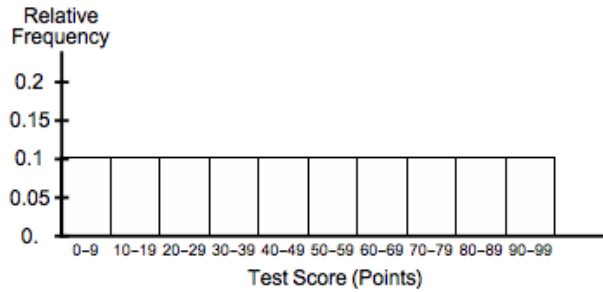
2) (5 points). A poll randomly selects 620 American adults. They are asked:

“What is the highest college degree that you hold: associate’s, bachelor’s, advanced, or none?”

Based on the observed frequencies below, find the corresponding relative frequencies. You may write your answers in fraction, decimal, or percent form. If you round off, round off to three significant digits. (Note: These figures are inspired by real data.)

Response	Frequency	Relative Frequency
Associate’s	65	
Bachelor’s	146	
Advanced	90	
(No degree)	319	
	Sum = n = 620	

3) (7 points). 70 students take an exam. A relative frequency histogram for their scores is below.

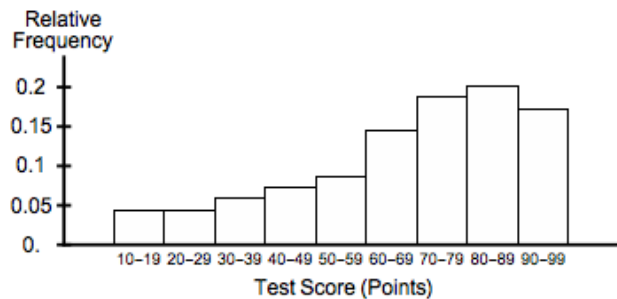


- a) (3 points). Estimate the relative frequency of scores in the 20s (between 20 and 29 points), as in class.

- b) (2 points). Name the type of distribution, as in class.

- c) (2 points). Box in the correct statement below.
 - § The distribution is skewed.
 - § The distribution is symmetric.

4) (2 points). Describe the skewness of the distribution below.



5) (3 points). Which statement below tends to be more true? Box in one:

- The mean is more sensitive to outliers than the median is.
- The median is more sensitive to outliers than the mean is.

6) (37 points). The sample data below are the ages (in years) of people arrested for theft and booked at a county jail.

18 16 25 24 19 18

(Based on some real data.)

(Show work as we have in class.) Based on this data ...

- a) (4 points). Find the **mean** age (in years) of people arrested for theft and booked at the jail.

- b) (2 points). Find the **median position number**.

- c) (4 points). Find the **median** age (in years) of people arrested for theft and booked at the jail.

- d) (4 points). Find the **mode** of the ages (in years) of people arrested for theft and booked at the jail.

- e) (4 points). Find the **midrange** of the ages (in years) of people arrested for theft and booked at the jail.

- f) (4 points). Find the **range** of the sample data values.

- g) (6 points). Fill out the following table. For the sample mean, use your answer to Part a).

	Data (x) values in years	Deviations $(x - \bar{x})$ values	Squared Deviations $(x - \bar{x})^2$ values
Person #1	18		
Person #2	16		
Person #3	25		
Person #4	24		
Person #5	19		
Person #6	18		

- h) (1 point). What do the deviations from the sample mean add up to?
- i) (4 points). Find the **sample variance**. Write your answer to one decimal place.
- j) (4 points). Find the **sample standard deviation**. Round it off to one decimal place.

- 7) (12 points). A student's grade report for a term is below. Round off the GPA for the term to two decimal places. As stated in class, grades of "A," "B," "C," "D," and "F" are worth 4, 3, 2, 1, and 0 grade points, respectively. A "+" modifier adds 0.3, while a "-" subtracts 0.3. Show work, as in class!

Grade Report		
Course	Number of Units	Grade
Music	3	D-
Biology	5	B+
Math	7	A

- 8) (10 points). So far, your grade record in a class looks like this:

Exam	% of overall grade	Your score (out of 100 points)
Quiz 1	10%	75
Quiz 2	10%	62
Midterm 1	15%	83
Midterm 2	15%	79
Final	50%	b

What must you get on the Final to get at least 80% in the class overall? (What kind of score do you need b to be?) Show work, as in class!

9) (12 points). According to the National Health Survey, the systolic blood pressures (in mm Hg) of women aged 18-24 years are approximately normally distributed with mean 114.8 mm Hg and standard deviation 13.1 mm Hg. (Note: mm Hg means “millimeters of mercury.”)

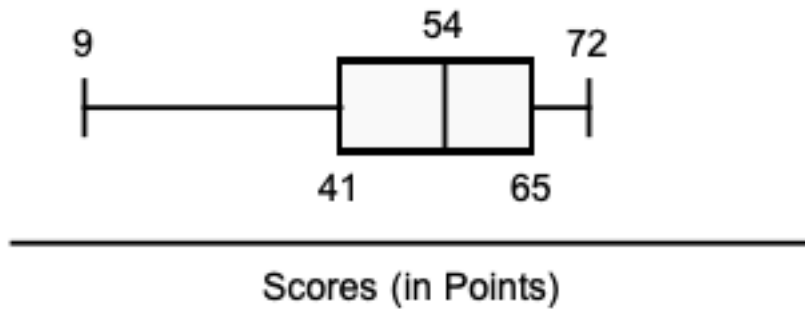
- a) (4 points). Use the “Two SD” (2σ) Rule for Usual Values to give an appropriate interval of usual systolic blood pressures (in mm Hg) of women aged 18-24 years.

- b) (2 points). According to the **Empirical Rule**, about what percent of systolic blood pressures (in mm Hg) of women aged 18-24 years are within **one** standard deviation of the mean?

- c) (2 points). According to the **Empirical Rule**, about what percent of systolic blood pressures (in mm Hg) of women aged 18-24 years are within **two** standard deviations of the mean?

- d) (4 points). Elizabeth is a 21-year-old woman. Her systolic blood pressure is 130.0 mm Hg. What is the **z score** for Elizabeth’s systolic blood pressure (among women aged 18-24 years)? Round off your answer to two decimal places. Note: Elizabeth’s systolic blood pressure would be in the “usual” interval of values.

- 10) (9 points). The scores on a test (in points) in a large class are summarized by the boxplot (also known as a “box-and-whisker” plot) below. The minimum score is 9 points. The maximum score is 72 points. There are no extreme outliers.



- a) (2 points). A score of 41 points is at which **percentile**?
- b) (2 points). A score of 65 points is at which **quartile**?
- c) (2 points). What is the **median** of the class scores?
- d) (3 points). What is the **IQR (Interquartile Range)** of the class scores?