Math 119 Name: _____

QUIZ 1

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

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

FORMULAS

$$\mu = \frac{\sum x}{N} \qquad \bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum \left(x - \mu\right)^2}{N} \qquad s^2 = \frac{\sum \left(x - \bar{x}\right)^2}{n-1}$$

$$\sigma = \sqrt{\frac{\sum \left(x - \mu\right)^2}{N}} \qquad s = \sqrt{\frac{\sum \left(x - \bar{x}\right)^2}{n-1}}$$

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

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

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

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

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

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

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

1) (3 points). A college has 1000 classes. In each class, five students are randomly selected to take a survey. What sampling method is being used here? Box in the best answer:

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

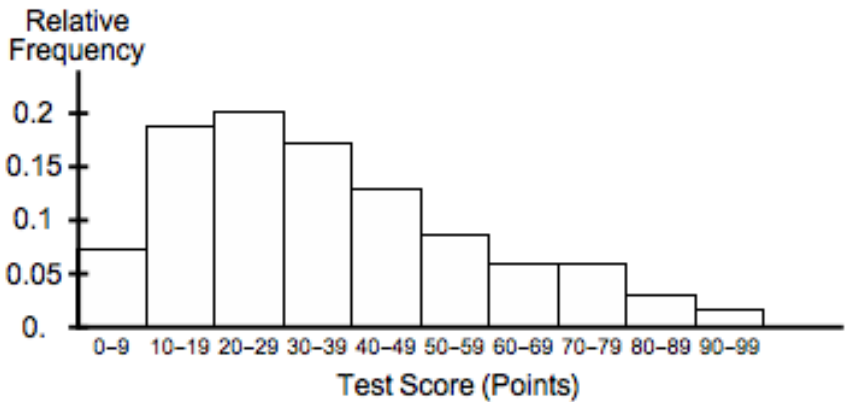
2) (4 points). A poll randomly selects 794 American adults. They are asked:

Do you tend to agree or disagree with the following statement: "It's time we accept that Covid is here to stay and we just need to get on with our lives."?

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: This was inspired by real data in a Monmouth University Poll, January 31, 2022!)

Response	**Frequency**	**Relative Frequency**
Agree	553	
Disagree	219	
Other responses	22	
	Sum = n = 794	

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 30s (between 30 and 39 points), as in class.

• b) (4 points). Describe the distribution shape, as in class. Consider modality and skewness.

4) (3 points). Give an advantage of the trimmed mean over the "regular" mean as a measure of center for quantitative data.

5) (40 points). The data below are the waiting times (in seconds) between ordering and receiving coffee for five randomly selected male customers at a Boston coffee shop.

120 160 60 160 100

(Note: This is based on real data in *Applied Economics*, April 2008, "Ladies First? A Field Study of Discrimination in Coffee Shops.")

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

- a) (4 points). Find the **mean** waiting time.

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

- c) (4 points). Find the **median** waiting time.

- d) (4 points). Find the **mode** of the waiting times.

- e) (4 points). Find the **midrange** of the waiting times.

Treat the waiting time data as sample data. Reminder: The data below are the waiting times (in seconds) between ordering and receiving coffee for five randomly selected male customers at a Boston coffee shop.

120 160 60 160 100

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

• g) (3 points). Box in the most appropriate sentence:

- The midrange and the range are measures of center.
- The midrange is a measure of center but the range is a measure of spread.
- The midrange is a measure of spread but the range is a measure of center.
- The midrange and the range are measures of spread.

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

	Data (x) values in seconds	**Deviations** $\left(x-\bar{x}\right)$ values	**Squared Deviations** $\left(x-\bar{x}\right)^2$ values
Man #1	120		
Man #2	160		
Man #3	60		
Man #4	160		
Man #5	100		

• i) (1 point). What do the deviations from the sample mean add up to?

• j) (4 points). Find the **sample variance**. You shouldn't have to round off.

• k) (4 points). Find the **sample standard deviation**. Round it off to one decimal place.

6) (12 points). A student's grade report for a term is below. Find 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**
Math	5	A-
Physics	3	B
Swimming	2	C+

7) (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	15%	80
Quiz 2	15%	85
Quiz 3	15%	90
Midterm	25%	95
Final	30%	*a*

What must you get on the Final to get at least 90% in the class overall? (What kind of score do you need *a* to be?) Show work, as in class!

8) (12 points). The term GPAs at a college for the Fall 2021 term were approximately normally distributed with mean 3.05 grade points and standard deviation 0.42 grade points.

• a) (4 points). Use the "Two SD" (2σ) Rule for Usual Values to give an appropriate interval of usual GPAs for Fall 2021 term GPAs at the college.

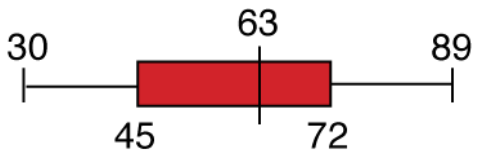
• b) (2 points). According to the **Empirical Rule**, about what percent of Fall 2021 term GPAs at the college are in the correct interval from Part a) – that is, the interval that is the correct answer to Part a)?

• c) (4 points). Rue Jacobs is a student at the college. Rue's GPA in Fall 2021 was 3.94 grade points. What was the ***z* score** for Rue's GPA in Fall 2021? Round off your answer to two decimal places.

• d) (2 points). Refer to Part c). Which of the following would be true, based on the "Two SD" (2σ) Rule for Usual Values? Box in the most appropriate statement:

- Rue's Fall 2021 GPA was "usual" at the college.
- Rue's Fall 2021 GPA was "unusual" at the college.

9) (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 30 points. The maximum score is 89 points. There are no extreme outliers.



Scores in Points

- a) (2 points). A score of 72 points is at which quartile?

- b) (2 points). A score of 72 points is at which percentile?

- c) (2 points). What is the **median** of the class scores?

- d) (3 points). What is the **IQR (Interquartile Range)** of the class scores?