

QUIZ 1

(LESSONS 1-10: INTRO and DESCRIPTIVE STATISTICS)
 MATH 119 – FALL 2019 – KUNIYUKI
 100 POINTS TOTAL

No notes or books allowed. A scientific calculator is allowed. Simplify as appropriate.

Check one:

Can you easily print files from the class website?

Yes. I can print exam solutions.

No. Give me exam solutions in class.

FORMULAS

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

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

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

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

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

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

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

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

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

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

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

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

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

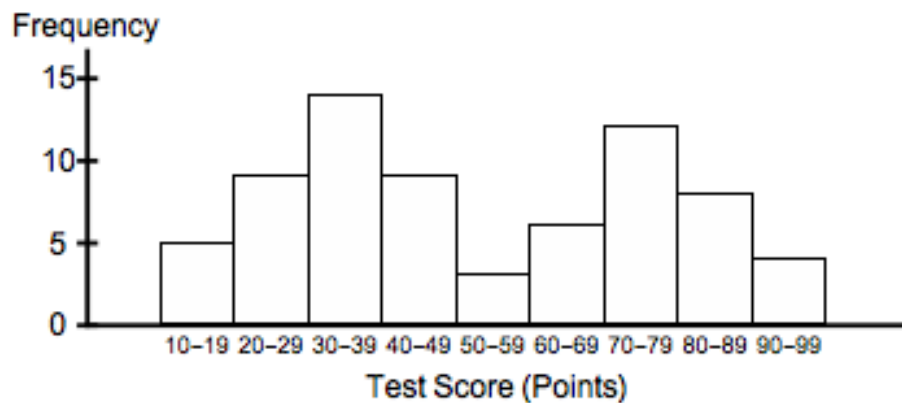
1) (3 points). A bookstore gives a survey to every tenth customer who makes a purchase. What sampling method is being used here? Box in one:

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

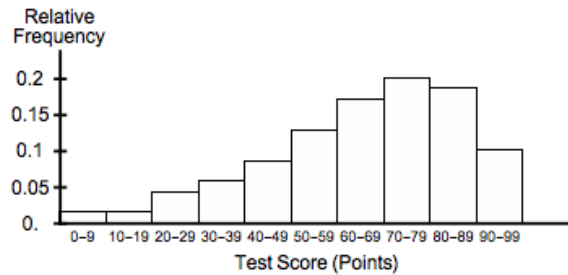
2) (3 points). A political polling firm randomly selects 250 registered voters in Fredonia and asks them if they are members of the Orange Party, the Purple Party, or neither. Based on the observed frequencies below, find the corresponding relative frequencies. You may write your answers in fraction, decimal, or percent form. Do not round off.

Party	Frequency	Relative Frequency
Orange	100	
Purple	80	
Neither	70	
	Sum = n = 250	

3) (3 points). 70 students take an exam. A frequency histogram for their scores is below. Estimate the number of students who scored in the 20s (between 20 and 29 points).



- 4) (4 points). 70 students take an exam. A relative frequency histogram for their scores is below. Describe the distribution shape. Consider modality and skewness.



- 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) (18 points). A drug company randomly selects seven people with diabetes to participate in a study. Their fasting blood glucose levels are tested and are recorded as follows (in milligrams per deciliter, or mg/dL).

160 209 177 209 179 300 166

(Showing work may help with partial credit.) Based on this data ...

- a) (4 points). Find the **mean** of the fasting blood glucose levels among the seven people.
- b) (2 points). Find the **median position number** of this data set.
- c) (4 points). Find the **median** of the fasting blood glucose levels among the seven people.
- d) (4 points). Find the **mode** of the fasting blood glucose levels among the seven people.
- e) (4 points). Find the **midrange** of the fasting blood glucose levels among the seven people.

- 7) (3 points). The mean is considered to be a very appropriate measure of center for which of the following types of distributions? Box in one (the best answer):
- a left-skewed distribution
 - a right-skewed distribution
 - a symmetric distribution

- 8) (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
English	6	C+
Math	5	B
Music	3	A-

- 9) (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%	40
Quiz 2	15%	55
Midterm 1	20%	65
Midterm 2	20%	70
Final	30%	c

What must you get on the Final to get at least 70% in the class overall? (What kind of score do you need c to be?) Show work, as in class!

10) (23 points). 1000 students in a large lecture class take a test. Four of the tests are randomly selected and are graded. Their scores in points are as follows:

55 80 95 70

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

• b) (4 points). Find the **sample mean**.

• c) (6 points). Fill out the following table:

Data (x) values	Deviations $(x - \bar{x})$ values	Squared Deviations $(x - \bar{x})^2$ values
55		
80		
95		
70		

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

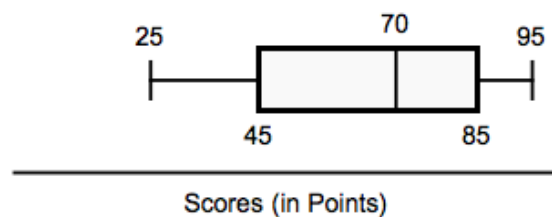
• e) (4 points). Find the **sample variance**. Round it off to one decimal place, but avoid rounding when doing f) below.

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

11) (10 points). Annual incomes of high-school teachers in Fredonia are approximately normally distributed with mean \$55,000 and standard deviation \$10,000.

- a) (4 points). Use the “Two SD” (2σ) Rule for Usual Values to give an appropriate interval of usual annual incomes for high-school teachers in Fredonia.
- b) (2 points). According to the **Empirical Rule**, about what percent of annual incomes of high-school teachers in Fredonia are within two standard deviations of the mean?
- c) (4 points). If a high-school teacher in Fredonia makes an annual income of \$40,000, what would be the z score for that income to two decimal places?

12) (8 points; 2 points each). 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 25 points. The maximum score is 95 points. There are no extreme outliers.



- a) A score of 85 points is at which quartile?
- b) A score of 85 points is at which percentile?
- c) What is the **median** of the class scores?
- d) What is the **IQR (Interquartile Range)** of the class scores?