

## Math 2265: Exam 1

Question	Question 1	Question 2	Question 3	Question 4	Total
Points	12	6	10	12	40

**Question 1:****Part (1)**

- A) Consumer Reports published an article on some sport utility vehicles they had tested recently. Identify each variable as either categorical or quantitative (circle one of each variable).

Price (in dollars):                      Categorical   Quantitative

Brand:                                      Categorical   Quantitative

Transmission type (Automatic or Standard): Categorical   Quantitative

Fuel Economy (in mpg):                      Categorical   Quantitative

**Part (2)**

A survey was conducted recently that recorded the amount that doctors charge for an office visit. A sample of size 30 was collected and sample statistics were computed.

- A) An error was found. The highest amount recorded was recorded as \$2,500 and should have been \$250. When the number is changed to \$250 it is still the largest value in the dataset. When the number is correct, how does each of the following change?

MEDIAN (circle one)	Increases	Decreases	<u>Stays the same</u>
MEAN (circle one)	Increases	Decreases	<u>Stays the same</u>
VARIANCE (circle one)	Increases	<u>Decreases</u>	Stays the same
IQR (circle one)	Increases	<u>Decreases</u>	Stays the same

- B) The new data is strongly skewed to the right.

- What is the appropriate measure of center (circle one)? Mean   Median
- What is the appropriate measure of spread (circle one)? Variance   IQR
- Which is greater, the mean or the median (circle one)? Mean   Median

- C) The amount (\$) that doctors charge is ..... variable (circle one).

Nominal                      Ordinal                      interval                      ratio

## Question 2:

1. Categorize each technique as **simple random sample**, **stratified sample**, **systematic sample**, **cluster sample**, or **convenience sample**.

**A.** Dr. Karabatsos wants to know if his students are doing homework so he randomly selects rows 1 and 4, and then calls on all students in row 1 and all students in row 4 to present the solutions to homework problems to the class.

*Cluster Sample*

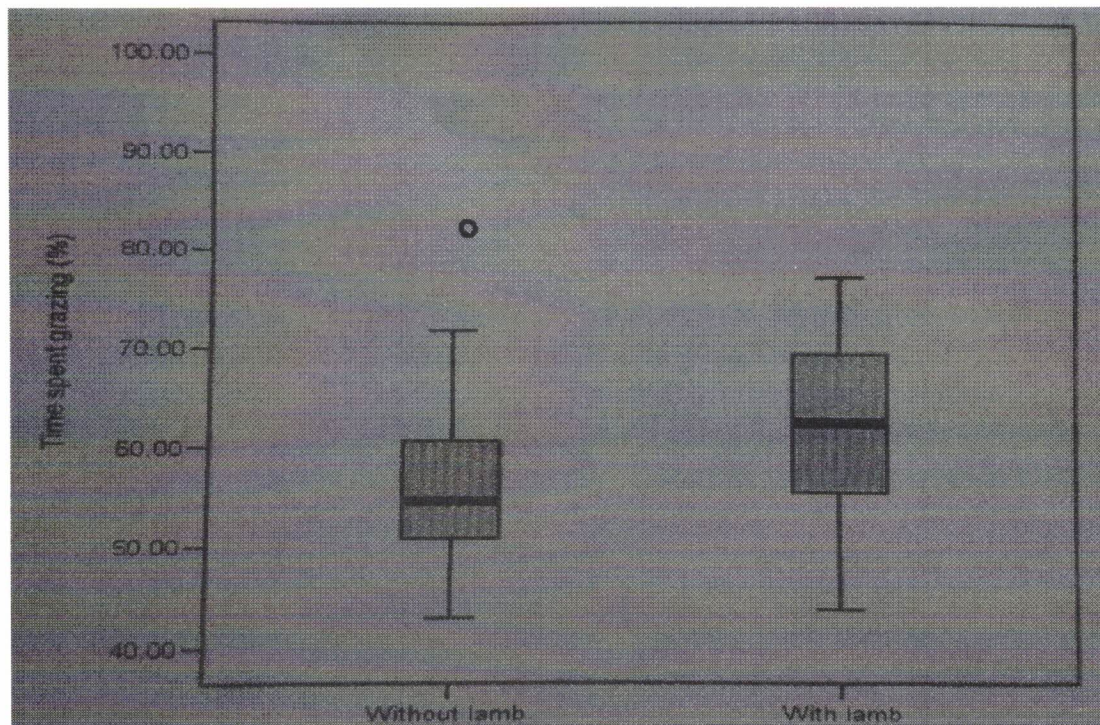
**B.** The administration of a large university is interested in learning about the types of wellness programs that would interest its employees. Suppose that there are four categories of employees (administration, faculty, professional staff, and clerical) and the university decides to randomly select seven individuals from each category.

*Stratified Sample*

**C.** Ms. Wang Standing at a grocery store and asking people to answer questions

*Simple Random Sample*

2. A study was conducted to determine whether having a lamb effected the grazing time of bighorn ewes. The boxplots from the study are shown below.



- A. Which group has a higher median (circle one)? Without lamb With lamb
- B. Which group has a higher IQR (circle one)? Without lamb With lamb
- C. Which group has an outlier (circle one)? Without lamb With lamb

**Question 3:** Suppose we have the following data points [2, 3, 4, 6, 8, 8]. Find the following:

1. Mean  $\frac{2+3+4+6+8+8}{6} = \frac{31}{6} = 5.17$

2. Mode = 8

3. Median  $\frac{n+1}{2} = \frac{7}{2} = 3.5$   
 $= \frac{4+6}{2} = 5$

4. Range

$8-2=6$

5. IQR

$Q_1 = 2 + 0.75 \times (3-2) = 2 + 0.75 = 2.75$

$Q_3 = 8 + 0.25(8-8)$   
 $= 8$

$IQR = Q_3 - Q_1$   
 $= 8 - 2.75$   
 $= 5.25$

6. Standard deviation (Show your work for full credit)

$\sqrt{\frac{(2-5.17)^2 + (3-5.17)^2 + (4-5.17)^2 + (6-5.17)^2 + (8-5.17)^2 + (8-5.17)^2}{5}}$

$= \sqrt{\frac{10.0489 + 4.0789 + 1.3689 + 0.6889 + 8.0089 + 8.0089}{5}}$

$= \sqrt{\frac{32.8334}{5}} = \sqrt{6.56668}$

$= 2.5626$



**Question 4:** Answer the following questions:

1. Alex and Tim took different sections of Elementary Statistics. Each section had a different final exam. Tim scored 83 out of 100 and had a percentile rank in his class of 72. Alex scored 85 out of 100 but his percentile rank in his class was 70. Who performed better with respect to the rest of the students in the class, Alex or Tim? Explain your answer.

72% of score was at or below Tim's score. 70% of the score was below Alex's score. So Tim performed better with respect to the rest of the students in the class

2. Consider a data set of 15 distinct measurements with mean A and median B. If the highest number were decreased to a value smaller than B, what would be the effect on the median and mean? Since the median is a positional average, which is not dependent on magnitude, there will be no change in median B. Since the mean is based on the magnitude of all values, as the highest number is decreased mean A will

also decrease.

3. Suppose your data standard deviation is 3. If we add 5 to each data value, what is the new standard deviation? Explain. Adding a constant to each value in a data set does not change the distance between values, so the standard deviation remains the same

4. What is the difference between parameter and statistic? Give an example of parameter and example of statistic. The difference is a statistic describes

a sample, a parameter describes an entire population

Example: Parameter  $\rightarrow$  Population Average Age

Statistic  $\rightarrow$  select a random 100 students out of 1,000  
The average height of the sample students.

5. A research studied the amount of money people spent on their most recent restaurant meal. The five-number summary for the sample is (in \$): Min: 2, Q1: 8, Q2: 16, Q3: 33, Max: 60. Is either the min of \$2 or the max of \$60 an outlier? Justify with computations

$$IQR: Q3 - Q1 = 25$$

$$\text{Lower fence: } Q1 - (1.5 \times IQR)$$

$$= 8 - (1.5 \times 25)$$

$$= -29.5$$

$$\text{upper fence: } Q3 + (1.5 \times IQR)$$

$$= 33 + (1.5 \times 25)$$

$$= 70.5$$

The minimum value is greater than the lower fence & maximum value is less than the upper fence. There are no outliers

$$\text{Outliers} = 0$$