Name: KEY. Form: A

Math 1342 Exam 1

EXAM INFORMATION

- This exam has 11 questions for a total of 100 points.
- Partial credit will be given for partially correct work.
- Circle your answers.
- You must show all work.
- Anyone caught cheating will receive an automatic zero for this exam, and there may be more severe consequences.
- No graphing calculators, phones, or other electronic devices may be used during the exam.
- You have 80 minutes to complete the exam.

I certify that I have read, understand, and agree to abide by the above rules.

Signature:_____

DO NOT TURN THE PAGE UNTIL TOLD TO DO SO BY YOUR INSTRUCTOR.

1. A two-way table is shown for two groups, 1 and 2, and two possible outcomes, A and B. Use the table to answer each question and show all work.

	Outcome A	Outcome B	Total
Group 1	40	10	50
Group 2	30	20	50
Total	70	30	100

(a) (3 points) What proportion of all cases had Outcome A?

$$\hat{p}_A = \frac{70}{100} = 0.7$$

(b) (3 points) What proportion of all cases are in Group 1?

$$\hat{p}_1 = \frac{50}{100} = 0.5$$

(c) (3 points) What proportion of cases in Group 1 had Outcome B?

$$\hat{p}_{1,B} = \frac{10}{50} = 0.2$$

(d) (3 points) What proportion of cases who had Outcome A were in Group 2?

$$\hat{p}_{A,2} = \frac{30}{70} = 3/7.$$

2. For the 2015 Intel Science Fair, two brothers in high school recruited 47 of their classmates to take part in a two-stage study. Participants had to read two different passages and then answer questions on them, and each person's score was recorded for each of the two tests. There were no distractions for one of the passages, but the participants received text messages while they read the other passage. Participants scored significantly worse when distracted by incoming texts. Participants were randomly assigned to either read without distractions first or read with text message interruptions first. Participants were also asked, "Are you good at multitasking?" and answers of yes or no were recorded.

(a) (3 points) What are the cases? 47 high school students participation

(b) (3 points) Consider the variable that records a student's score on the test for the passage without interruptions. Is this variable quantitative or categorical? Circle the correct answer.

(Quantitative) OR Categorical

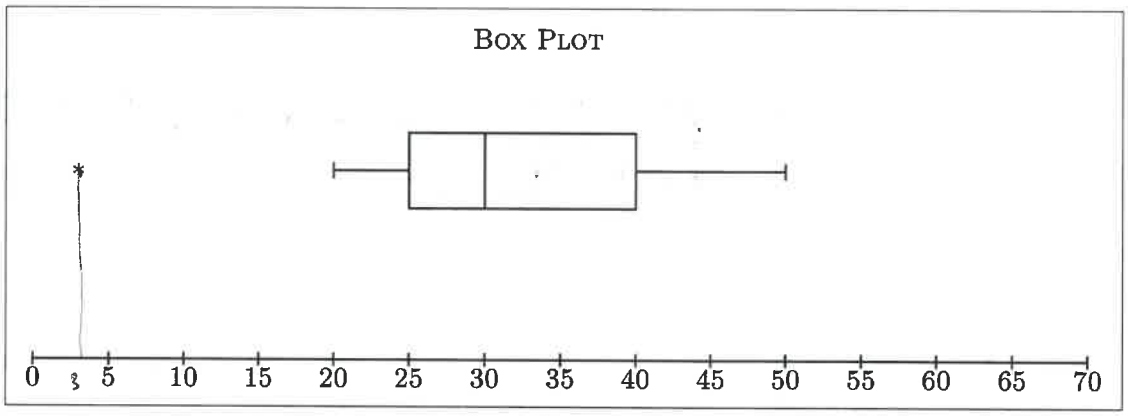
(c) (3 points) Is the variable that records the student's response to the question "Are you good at multitasking?" quantitative or categorical? Circle the correct answer.

Quantitative OR (Categorical)

(d) (3 points) Is this an example of a randomized comparative experiment or a matched pairs experiment? Circle the correct answer.

randomized comparative experiment OR (matched pairs experiment)

3. Below is a boxplot for a dataset.



(a) (10 points) Find the five number summary for the dataset. (3, 25, 30, 40, 50)

(b) (3 points) Find the range for the dataset. range = max - min
= 50 - 3 = 47.

(c) (3 points) Find the IQR for the dataset.

IQR = $Q_3 - Q_1$ = 40 - 25 = 15

4. (6 points) Consider a dataset with five number summary (5,10,12,16,30) and tails

$$5, 5, 6, 6, 6, \ldots, 22, 22, 23, 28, 30.$$

Identify any outliers in the dataset. Show all your work. List the outliers in the blank provided. The outliers are 28, 30

$IQR = 16 - 10 = 6$

$1.5 \times IQR = 1.5 \times 6 = 9$

$Q_1 - 1.5\,IQR = 10 - 9 = 1$ (1 is going to be an outlier)

$Q_3 + 1.5\,IQR = 16 + 9 = 25$ (25 is going to be an outlier)

5. Consider a dataset with a variable for height, measured in inches. The values recorded for this variable for a sample of size 8 are 65, 49, 72, 73, 60, 69, 64, 71.

(a) (3 points) What is the correct notation for the population mean? μ (mu)

(b) (3 points) What is the mean height for the cases in this sample?

$$\bar{X} = (65 + 49 + \cdots + 64 + 71)/8 = \frac{523}{8} = 65.375$$

(c) (3 points) What is the median height for the cases in this sample?

(arrangement ↑ or ↓) 49, 60, 64, 65, 69, 71, 72, 73

$$\text{Median } (m) = \frac{65 + 69}{2} = 67$$

6. (10 points) Which of the following is resistant to outliers? Circle the correct answer

A. standard deviation
B. mean
C. maximum
D. median

7. (a) (3 points) Consider Sample A with mean 200 and standard deviation 10. One of the values in Sample A is 185. Compute the z-score for this value.

$$\text{Z-score} = \frac{x-\bar{x}}{s} = \frac{185-200}{10} = \frac{-15}{10} = -1.5$$

(b) (3 points) Consider Sample B with mean 50 and standard deviation 5. One of the values in Sample B is 54. Compute the z-score for this value.

here, it will be $\frac{54-50}{5} = \frac{4}{5} = 0.8$

(c) (3 points) Which of these sample values is more unusual?

greater the absolute value of Z-score, the more unusual sample is.

Hence, here it's 185 from SAMPLE A

8. In a sample survey of professors at the University of Nebraska, 94% of them described themselves as "above average" teachers.

   (a) (3 points) What is the sample?

   the professors surveyed

   (b) (3 points) What is the population?

   all Univ of Nebraska profs.

9. (3 points) Consider an agricultural experiment in which we record for each acre of land the amount of fertilizer used and the yield of a cotton crop. What is the explanatory variable?

   amount of fertilizers used

10. Suppose Dr. Hgnis wanted to determine the average height of students in section of MATH 1342 at UT-Tyler by taking a sample of students.

(a) (2 points) If he chose his sample from among the female students in MATH 1342, would this yield a random sample? Circle the correct answer.

Yes OR (No)

(b) (2 points) If he chose his sample from among the students who live on campus, would this yield a random sample? Circle the correct answer.

Yes OR (No)

(c) (2 points) Let's say, he chooses his sample by flipping a coin once for each student. If the coin lands on heads, that student goes in the sample. If the coin lands on tails, that student does not go in the sample. Would this yield a random sample? Circle the correct answer.

(Yes) OR No

(d) (2 points) If Dr. Hgnis built his sample by inviting students to send him an email with their name and height, would that build a random sample? Circle the correct answer. Then **justify your answer**.

Yes OR (No)

(VOLUNTEER BIAS)

11. A dataset has been built by surveying students and recording variables including each student's weight, measured in pounds, and height, measured in inches. A regression line to predict weight from height is

$$\widehat{\text{Weight}} = -170 + 4.82(\text{Height}).$$

(a) (3 points) What weight does the line predict for a student who is 60 inches tall?

$\hat{\text{weight}} = -170 + 4.82 \times 60$

$= 119.2$ lbs.

(b) (3 points) An actual case in the survey had height 60 inches and weight 130 pounds. What is the residual at this data value?

residual = observed value - predicted value

$= 130 - 119.2$

$= 10.8$ lbs.

(c) (3 points) What is the intercept of the line? Write your answer in the blank provided. If it is reasonable to do so, interpret the intercept in context. If if is not reasonable to do so, explain why it is not.

The intercept is -170.

CAN'T be interpreted as a weight can't be a negative quantity. Additionally, this intercept occurs when Height = 0, but height of a person can't be 0.