

Math 160
Sample Final Examination

Short Answer - minimum explanation and calculations necessary.

1. Give an example of a small set of data where the mean is larger than the third quartile.

2. Evaluate

$$\sum_{i=1}^4 2 \cdot i.$$

3. What is a “lurking variable” in the context of regression analysis?

4. What is a double blind experiment?

5. What is a parameter, in the context of Random Sampling?

6. Give an example of a discrete random variable with an equiprobable model.

7. What number(s) specifies a Binomial Distribution?

8. For every statistical procedure we have studied, there is a single fundamental requirement for the sample on which the procedure is based. What is it?

9. A smaller p-value is stronger evidence for H_a . T/F/NMI (Not much information)?

10. Suppose $H_0 : \mu = \mu_0$. Set up a one-sided H_a .

11. A statistical test of hypotheses correctly carried out establishes the truth of one of the two hypotheses, either the null or the alternative one. T/F/NMI?

Here is a five number summary for the grades in Exam 3:

36 82 90 99 100

Give the symbol for each of the five numbers in the summary, its name, and what it tells you about the distribution of test scores.

16.

17.

18.

19.

20.

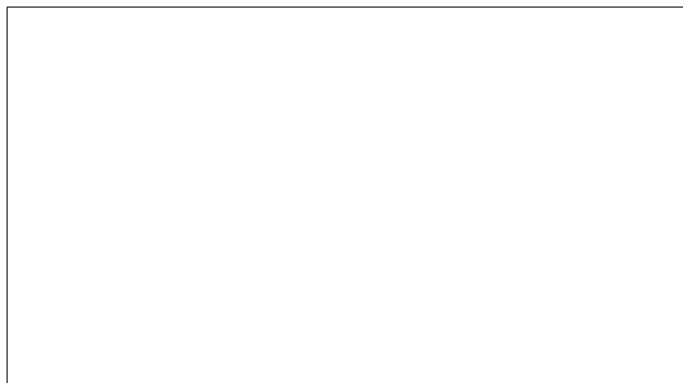
Long Answer - show work and provide explanations, an answer without supporting work is not worth much. In general, use four decimal places when the answer cannot be given exactly

1. The following are a set of golf scores for a university team in tournament play: 79, 81, 83, 86, 87, 88, 89, 90, 91, 95, 102.

Make a stem plot of this data. Compute *by hand, showing all work*, the mean and the first quartile for this data (you may do the arithmetic on your calculator, but you must show the sums or fractions used). Get the rest of the information needed from your calculator and sketch a boxplot for the data. You will need to label your axes properly.

2. Suppose you have a set of paired data and calculate a LSRL. In this context, discuss what a residual is, what is it used for, and how it might be plotted. Include in your discussion sketches of at least three different patterns which the plots might assume, and what these shapes tell you about the LSRL. You will need to label your axes correctly.

3. Draw a Venn Diagram using the following probabilities; $P(B) = .45$, $P(F) = .5$, $P(B \cup F) = .65$.



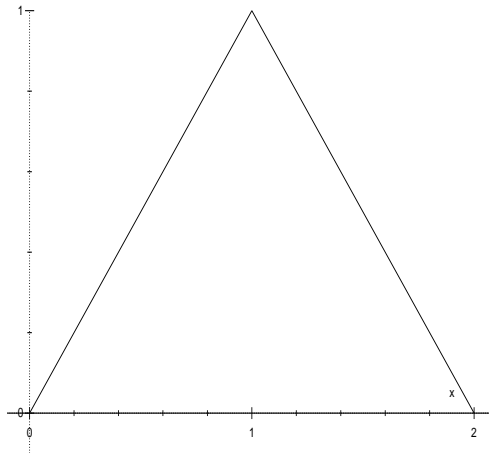
- a. Find $P(F \cap B)$
- b. Find $P(B|F)$
- c. Are B and F independent. Why or why not?
- d. Are B and F disjoint. Why or why not?
- e. Are B and B^C independent. Why or why not?

4. Suppose that I have a random variable with probabilities given by the following table:

i	x_i	$P(X = x_i)$
1	2	0.2142
2	1	0.1399
3	-2	*

Calculate the mean μ and standard deviation σ of this distribution, showing all calculations.

5. Suppose that Y is the random variable obtained from generating two random numbers from the Uniform distribution on $[0,1]$, and adding them. Y can take any value between 0 and 2. The density curve for y is shown below.



- Verify by geometry that this is a valid continuous probability model.
- Consider $P(1 \leq Y \leq 1.5)$. Draw, on the figure a representation of this probability.
- Calculate the probability in part b.
- Find μ for this distribution and explain what you did.

6. A simple random sample of size 60 is taken from a normal population known to have a standard deviation of 5. The mean of the sample is 25.
- What is the sampling distribution of the mean?
 - Calculate the z^* and margin of error for a 92% Confidence Interval for μ from this sample
 - Calculate the 92% CI for μ .
 - Explain clearly and carefully to a person who has no knowledge of statistics what a 92% CI is, with particular attention to the meaning of the word "Confidence."

7. Find the value in the z -table that comes closest to satisfying each of the conditions below
- the value with .25 of the observations falling above it.
 - The value with .40 of the observations falling below it.
 - The value such that $P(Z \leq z) = 0.8$.
 - The value such that $P(Z \geq z) = 0.13$.

8. A critical dimension of an automobile crankshaft is supposed to be 224 mm, and the variability is unknown. A sample of 16 has $\bar{X} = 224.002$, and $s = 0.0618$. The sample is slightly skewed, but has no outliers.

a. Are the t procedures acceptable?

b. Is there evidence that the population mean for this dimension is not 224 mm. State the hypotheses, give the degrees of freedom, and use the table supplied or your calculator to obtain p . What do you conclude.

9. The Exam 2 average score of 23 students was 80 while the standard deviation was 18.82. For Exam 3, the mean and the standard deviation were 85.75 and 16.86. Only 22 students took that test. Assuming that the student scores follow Normal distribution, test if there has been any significant increase in the mean score.

10. In Exam 2, 8 students got *A* grade and 6 got *B*. In Exam 3, 12 students got *A* and 5 got *B*.
- Use a 90% CI to estimate the difference in proportions of students who got an *A* grade in Exam 2 and Exam 3. Do it similarly for *B* grades.
 - Is there good evidence that students did significantly better in Exam 3?