

100 points

Problem Set 3 MATH 207

Name _____

Spring 2011

You may use your notes, a calculator, the typed notes, but you may not consult another person. Due class time on Wednesday, April 4, 2011.

This represents my work.

Bonus: (1) 3 people problem for 20 points

(2) rectangles on a checkerboard (10 points) and rectangles on an “m x n” board where $m > n$.

1. Data Analysis/Hypothesis testing: (40 points)

The weights of girls who play high school soccer for a given county are recorded as follows:

145	175	160	149	132	108	160	176	158	135	147	149	131	181
170	158	151	150	148	137	142	148	125	158	163			
140	135	138	160	155	147	139	127	163	155	165			
151	145	171	146	145	139	150	147	164	158	142			
108	115	125	140	134	124	168	154	139	160	171			
121	167	153	146	132	120	134	158	146	137	116			

Part I: Descriptive:

(a) Is there an outlier? If so, discard. Explain your decision.

(b) Make a histogram that is consistent with the rules for making histograms and that has 7 - 8 classes.

(c) Is the data significantly skewed?

Part II: Hypothesis Testing:

(d) Construct a 95% confidence interval for the mean of the above data set.

Clearly give the meaning of this interval.

(e) The mean weight for girls was projected to be 145 pounds. Is there a significant difference between the above data set and the projected mean? Give the null hypothesis, test statistic, p-value, and conclusion. Interpret your findings.

(f) Are the results from parts (d) and (e) consistent? Clearly explain.

Part III: Hypothesis Testing continued:

Weights for 20 college girl soccer players were taken. It was found that the average weight of this group is 153 pounds with a standard deviation of 14.5 pounds.

(g) Is there a significant difference in the variances of the two groups, between the above group of high school soccer players and the 20 college players? Use an appropriate alpha level.

(h) Is there a significant difference in weight between the two groups? Give the null hypothesis, test statistic, p-value, and conclusion. Interpret your findings.

2. Hypothesis Testing (theoretical): (20 points)

Sketch the graphs of $f(x) = \theta e^{-\theta x}$ for $\theta = 4$ vs $\theta = 2$ and show the area that represents alpha and beta when testing $H_0: \theta = 4$ vs $H_0: \theta = 2$ for one observation. Use alpha level of .20.

(a) Is the right or left tail the more powerful test? Sketch the graphs and shade the appropriate regions for alpha and beta, for both the right and the left tail tests. Give the rejection region for each. (Colored pens help with this.)

(b) Also construct a two-tailed test. Sketch and find the intersection point of the two functions. Show clearly the alpha and beta regions for a two-tailed test (.10 area in each tail for the alpha of .20)

3. Hypothesis Testing: (15 points)

The newspaper stated that 50% of all voters will vote on the school bond issue. A sample of 2145 was obtained. Of these, 1214 voted.

(a) Do the results of this sample support the belief? State the null hypothesis, test statistic, p-value, and conclusion. Interpret your findings.

(b) Create a 95% confidence interval for the proportion in the sample.

(c) Are your results consistent? (Parts a and b)

4. Hypothesis Testing: (18 points)

In the production line of a particular television, a particular part was taking more time than any other part, thus was holding up total production. Therefore, management decided to play some up-beat music piped into that section of the building. Worker output was known the week prior to the music and then the output was determined with the music. Did the music make a difference in production? Counted is the number of parts produced by each worker.

Person	A	B	C	D	E	F	G	H	I	J	K
pre	6	8	10	9	10	12	9	7	8	11	7
post	10	12	9	12	15	13	11	6	11	13	10

a) Check for outliers in the difference and discard if necessary. Explain what you are doing.

b) Is the new distribution significantly skewed?

c) Did music make any difference? Show all five steps in hypothesis testing.

d) If you needed to "downsize" who would you remove and why.

5. Two articles were posted on the class conference, under the sub-conference class notes, *Relationships Cause and Causal* and *Statistical Myths*. Read these and explain in a clear well constructed couple of paragraphs why relationships cannot involve cause and effect. This is related to Regression which will be the topic on Friday, April 1. (7 points)

