MA 222 EXAM #4 May 4, 2015

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I pledge my honor that I have abided by the Stevens Honor System.

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Closed book, closed notes. No electronic access. Answer all questions.

1. Define, for statistical hypothesis testing :

a) a statistical hypothesis

b) Test statistic

c) Critical (rejection) region

d) Type I error

e) Type II error

f) the significance level of a Hypothesis Test

2. If a sample of 100 people contains 15 left-handed people,

a) compute a 95% confidence interval for the proportion of left-handers in the population

b) if we were to take a larger sample the next time we do this experiment, would we expect the confidence interval to be wider or narrower than the one in part a)?

c) If we computed a confidence interval with a higher (say 98%) confidence level for the sample in part a), would the new confidence interval be wider or narrower than the 95% confidence interval computed in part a)?

3. Scores on a test are assumed to be normally distributed. A sample of 15 scores yields an average score of 72 with a sample standard deviation of 7. Compute the 98% confidence interval for the population average score.

4. For the upcoming election between candidate A and Candidate B, how many voters do we need to sample so that we are 99% sure that our sample proportion of voters voting for Candidate A will be with one percentage point of the true population proportion of voters voting for Candidate A?

5. A machine produces components whose diameters are normally distributed and are supposed to have a mean diameter of 8.2 mm. To see if the machine is “in control”, a random sample of 35 components is taken and the diameters measured. The mean of the 35 sample measurements is 8.23mm, and the standard deviation of the 35 sample measurements is 0.025 mm.

a) Perform a statistical test at the 5% significance level to see if the data indicate that the mean diameter has changed from 8.2 mm.

b) Find the interval estimate for the true average diameter, using a 95% confidence level.

c) What is the relationship between the answers to a) and b) ?

6. A newspaper reported that they polled a random sample of 1500 voters and found that in an upcoming election 54% of the voters preferred Candidate A with a “margin of error” of ± 1 percentage point.

What confidence level is implied by this statement?