The Pennsylvania State University

Department of Economics

Econ 390, Section 101, Summer 2007

Homework Assignment # 4

Due: Monday, June 18, AT THE BEGINNING OF CLASS

Problem 1

Assume that the standard deviation of monthly rents paid by students in a particular town is $40. A random sample of 100 students was taken to estimate mean monthly rent paid by the whole student population.

a. What is the standard error (standard deviation) of the sample mean monthly rent?

b. What is the probability that the sample mean exceeds the population mean by more than $5?

c. What is the probability that the sample mean differs from the population mean by more than $3?

Problem 2

For an audience of 600 people attending a concert, the average time on the journey to the concert was 32 minutes, and the standard deviation was 10 minutes. A random sample of 150 audience was taken.

a. What is the probability that the sample mean journey time was more than 31 minutes?

b. What is the probability that the sample mean journey time was less that 33 minutes?

c. Draw a graph to illustrate why the answers to part (a) and (b) are the same?

d. What is the probability that the sample mean journey was not between 31 and 33 minutes?

(**Hint:** think about what is the population here)

Problem 3

A charity has found that 42% of all donors from the last year will donate again this year. A random sample of 300 donors from the last year was taken.

a. What is the standard error (deviation) of the sample proportion who will donate again this year?

b. What is the probability that more than half of these sample members will donate again this year?

c. What is the probability that the sample proportion is between 0.40 and 0.45?

Problem 4

A mathematics test of 100 multiple-choice questions is to be given to all freshman entering a large university. Initially, in a pilot study the test was given to a random sample of 20 freshman. Suppose that, for the population of all entering freshman, the distribution of number of correct answers would be normal with variance 250.

a. What is the probability that the sample variance would be less than 100?

b. What is the probability that the sample variance would be more than 500?

Problem 5

A personnel manager has found that historically the scores on aptitude tests given to applicants for entry-level positions follow a normal distribution with a standard deviation of 32.4 points. A random sample of nine test scores from the current group of applications had a mean score of 187.9 points.

Find 80% confidence interval for the population mean score of the current group of applicants.

Problem 6

A car rental company is interested in the amount of time its vehicles are out of operation for repair work. State all assumptions and find a 90% confidence interval for the mean number of days in a year that all vehicles in the company's fleet are out of operation if a random sample of nine cars showed the following number of days that each had been inoperative:

16 10 21 22 8 17 19 14 19

Problem 7

Suppose that a random sample of 142 graduate admissions personnel was asked what role scores on standardized tests (such as the GMAT or GRE) play in the consideration of a candidate for graduate school. Of these sample members 87 answered "very important". Find a 95% confidence interval for the population proportion of graduate admissions personnel with this view.