Name: _____ **MAT 221**
Fall 2014 **Problem Set 9**

Problem 1: Suppose that a student measuring the boiling temperature of a certain liquid observes the six readings and obtained the sample mean of 101.8 (in degrees Celsius). Also assume that the standard deviation for this procedure, σ, is 1.2 degrees.

(a) Construct a 95% confidence interval for the mean boiling temperature of this liquid.

(b) Suppose you wanted to cut the margin of error to ± 0.5 with a confidence interval of 95%. How many total readings would have to be included in the new sample?

Problem 2: A waitress' tips are somewhat left-skewed with mean \$4.75 and standard deviation \$2.50, A simple random sample of 40 of her tips is taken. Find the approximate probability that the sample mean of these 40 tips is greater than \$5.50. Does the skewness of the tips effect your calculations?

Problem 3: The percentage of students at some university that wear contacts is 30%.

(a) A simple random sample of 8 university students is taken. What is the probability that exactly 5 of these students wear contact lenses?

(b) A large sample of 150 students is taken. Find the mean μ and standard deviation σ of the number of students in this sample who wear contact lenses.

(c) For the larger sample in (b), use the normal approximation to estimate the probability that at least 55 in the sample wear contact lenses.

Problem 4: A exam for the preparedness of students for college has mean $\mu = 75$ and standard deviation $\sigma = 8$. What is the proportion of students that scored lower than 82? If the top 3% get a scholarship, what is the minimum score a student would have to get to have a hope of getting the scholarship?

Problem 5: Many students at an "elite" university took a college exam over the course of a decade. Over this time, the exam scores had mean 558 with standard deviation 139. We suspect that the grades of these students has actually increased over time. We take a simple random sample of 100 students at an "elite" university, and find a sample mean of 585 for this elite school.

(a) State H_0 and H_a for this situation.

(b) Use a significance level of $\alpha = 0.05$ to test H_0 against H_a. Compute the test statistic and p-value. Determine whether H_0 is rejected and write your conclusion in words.