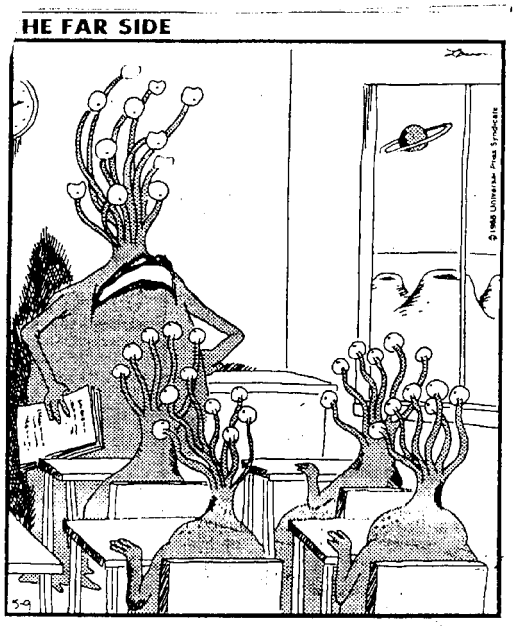
ID# _____ Exam 1 Spring 1994

Read each question carefully and answer it completely, showing all of your work in arriving at your answer. The Skidmore Honor Code is, of course, in effect for this exam (see below), so keep your eyes scrupulously on your own exam. The point value of each question is indicated and I tend to think of points as minutes, so you shouldn't spend 20 minutes on a question worth 5 points. With 50 total points, I'm expecting most people to finish the exam in 50 minutes. Best of luck on this exam!



1. Suppose that you define some population and then construct a sampling distribution of the mean for samples of n=25 from that population. The variability of the sampling distribution (its standard error) will be less than the variability of the population. Why? Don't answer by simply reproducing the appropriate formula, but explain in words why the formula is what it is. Providing examples always helps. [5 pts]

2a. Suppose that I give each of you an IQ test, creating a sample of 30 IQ scores. We know that in the population at large, IQ scores are supposed to be normally distributed with a mean (μ) of 100 and a standard deviation (σ) of 15. Using only logic, would you expect that the sample mean would be roughly 100? Explain your answer. [3 pts]

2b. Assume that the sample mean for IQs in this class turned out to be 110. How would you make use of that information to test the hypothesis that your IQs are randomly sampled from the population at large? Be sure to show all your steps, including the null and alternative hypotheses. Ultimately you must make a decision to retain or reject H_0. In this case what did you decide? Could you be making a Type I or a Type II error in your decision? State which one you might be making and what such an error implies about your decision. [10 pts]

3a. Below is a sample of 9 Grade Point Averages (GPAs), rounded off to the nearest integer. Estimate the population parameters μ, σ^2 and σ. [10 pts]

GPA
4
3
3
3
2
1
4
3
3

3b. As you might imagine, GPAs at Skidmore are not normally distributed. In fact, they are negatively skewed (can you guess why). Given your estimate of μ above, what could you then tell me about the value of the median GPA at Skidmore? The modal GPA? (Don't compute from data above, only use what you know about skewed distributions to give "rough" estimates.) [2 pts]

4. Dr. Seymour Means is interested in the measuring reaction times (RTs) for people who are asked to press a button upon detecting a target. These RTs are measured in milliseconds (msecs, one-thousandths of a second) and are normally distributed in the population with a mean (μ) of 450 msec and a standard deviation (σ) of 15 msec.

a. What percentage of the population would have scores between 460 and 480 msec? [4 pts]

b. What percentage of the population would have scores greater than 435 msec? [4 pts]

c. What reaction time would a person need to be at the 75th percentile? [4 pts]

d. Unusually fast and slow responders are those in the upper and lower 2.5% of the population. In this case, what RTs would those people exhibit? [4 pts]

e. You could convert every one of the RTs in the population to z-scores. If you did so, what could you tell me about the distribution of z-scores in terms of central tendency, variability, and shape. Be specific. [4 pts]