# Midterm 2A–Stat 100–Spring 1997

You may use calculators, but not books or notes. Each problem is worth 20 points. Different parts of a problem have equal weight unless otherwise indicated. Do not spend too much time on any one problem. Put a box around the final answer to a question.

1. Suppose $Z$ has standard normal distribution.
   a. (6 points) Find $P[Z > -1.02]$ and $P[Z \geq -1.02]$
   b. (6 points) Find $P[-1 < Z < 2]$
   c. (8 points) Determine the value of $a$ so that $P[-a < Z < a] = 0.95$

2. Suppose 20% of the children in a town have a certain virus.
   a. (17 points) Estimate the probability that, in a random sample of 300 children, the number of children with the virus will be between 50 and 70 inclusive.
   b. (3 points) Briefly justify your approximation procedure.

3. Suppose a population of men has average weight 170 pounds with standard deviation 15 pounds.

   Estimate the probability that the average weight of a random sample of 400 men from this population is greater than 171 pounds.

4. A reporter wants to know the average commuting time to work in the metropolitan D.C. area. Suppose the standard deviation of commuting times is known to be 14 minutes. The reporter will collect a random sample of commuting times and wants to be at least 95% sure that the sample mean is within 2 minutes of the actual mean.

   How large should the sample be?

5. The campus food service conducts a survey to estimate the proportion of students who eat breakfast every day. Out of 250 students surveyed, 200 eat breakfast every day.
   a. (17 points) Construct a 99% confidence interval for the proportion of students who eat breakfast every day.
   b. (3 points) Would a 95% confidence interval be narrower or wider than the 99% confidence interval?