Name

Problem Set # 1
Due October 17, 2005

This is the 1st of 3 problem sets. They shouldn't take you long, but are really a check to make sure that you're familiar with the mathematics that we're doing in class. Please let me know if you have any difficulty.

Remember, the work you submit is expected to be your own. You may discuss how to do a problem or problems with your classmates, however, you should actually write out the solutions on your own. We consider any copied or *collaborative* homework solutions to be plagiarism, about which we refer you to the student handbook.

1. In Rosencrantz and Guildenstern, the two flip coins and Rosencrantz wins if a heads comes up, and Guildenstern wins if a tails comes up. The two, as you'll recall, flip something like 100 times with heads coming up every time.

If you were Guildenstern, how many flips would it take before you would seriously question the outcome (rigged coins, for example)? Justify this mathematically, and note that for most scientists, things which are only 5% likely are considered significant.

2. You and a friend are playing a friendly game flipping coins. Your friend, however, is a big cheater, and the coin is weighted 40% heads, 60% tails (you have heads, naturally). After 100 flips:

   a. On average, how many heads do you expect to have?

   b. What's the scatter (σ) in that range?

   c. Explain qualitatively what will happen if you continue to play. Naturally, you will continue to lose, on average, but will your return get closer to or further from a 40% return?