Homework 3

1. According to a study based on the National Survey on Drug Use and Health, marijuana use has increased significantly among adults age 50 and up. In particular, among people ages 50 to 64, 7.1% have used marijuana in the past year. You walk into a store and see a group of 12 adults born between 1953 and 1966. Assume that these people can be viewed as a random sample of adults ages 50 to 64.
   (a) What is the exact probability that exactly three of the people used marijuana in the past year?
   (b) What is the exact probability that fewer than two of the people used marijuana in the past year?
   (c) What is the expected number of people who used marijuana in the past year? What is the standard deviation of the number of people who used marijuana in the past year?
   (d) Say there are 850 people aged 50 to 64 years at an oldies concert. What is the probability that more than 50 of them used marijuana in the past year? An approximate answer is good enough here.

2. According to admissions statistics, the Stern MBA class of 2019 has an average GMAT score of 714. Assume that the GMAT scores follow a normal distribution, with standard deviation 38.1.
   (a) What is the probability of a randomly chosen student’s GMAT score being greater than 730?
   (b) What is the probability of a randomly chosen student’s GMAT score being less than 680?
   (c) What is the probability that the average GMAT score of the five members of a randomly selected study group is less than 680?
   (d) A member of the class of 2019 says that her class is smarter than last year’s Stern class, claiming an average GMAT score of 710 for the class of 2018. A member of Stern’s class of 2018 replies that “There are just as many really smart people in my class,” claiming that both classes have the same probability of finding a student with GMAT greater than 750. Assuming that this statement is true, what is the standard deviation of GMAT scores for the students from the class of 2018?

3. According to the American Statistical Association (ASA), the median annual salary for statistics (full) Professors at research universities with 17 or more years in that rank is $158,450, and 25% of such Professors earn less than $134,996. Assume that salaries follow a normal distribution.
   (a) What is the probability that a randomly chosen Professor earns more than $120,000?
   (b) What is the probability that a randomly chosen Professor earns less than $160,000?
   (c) What is the probability that the average salary of a group of ten randomly selected Professors is between $150,000 and $165,000?
(d) Say we didn’t assume that the salaries were normally distributed. According to the ASA, 25% of such Professors earn more than $189,000, and 10% earn more than $235,975. Based on what you’ve been told, describe what you think the distribution looks like.

**Homework due: October 24**

*Note:* You will not get your graded homework back before the midterm exam, so I suggest that you make a photocopy of your homework (or keep the computer file) before you hand it in. I will be giving out a copy of the answers (and posting them on the class web site) in class on October 24, so you can see how you did from them. Note that no late assignments will be accepted after the answers are handed out.