Reminder: To receive full credit for your homework, you should include as part of your solution a brief description of the problem that suffices to put the calculations you present or the results you provide in context. Part of what you are learning/practicing in this course is the skill of communication in writing. Also, please number your solutions as they are numbered on this assignment, as this makes grading go much more smoothly.

This assignment includes problems related to the binomial and normal distributions. For the problems that ask you to calculate binomial probabilities, make sure that you can do this both using your calculator and using R. R will be very useful for later assignments, but you may need to do this with your calculator for future mastery exams. Similarly, for problems that ask you to calculate normal probabilities, R will be the easiest, but you will need to know how to use the normal table for exams.

1. List the four conditions that indicate when the binomial distribution is an appropriate probability model for an application.

2. For each of these examples, indicate why the random variable X does *not* have a binomial distribution. (In other words, list which condition(s) from the previous problem are not met.)

   (a) A cage contains nine mice, three of which are female. X is the number of female mice in a simple random sample of four mice from the cage.

   (b) In a botany experiment, a student plants forty seeds in separate pots. All experimental conditions are as identical as possible except that twenty of the pots are watered every day while the other twenty are watered every other day. X is the total number of seeds that have germinated after one week.

   (c) In a particular region, previous studies have shown that thirty percent of the mushrooms are of a specific species of interest. A biologist randomly samples mushrooms (of all species) from this region until she has collected twenty specimens of the species of interest. X is the total number of mushroom specimens sampled.

3. Exercise 3.16 (page 113).

4. Exercise 3.18 (page 113).

5. Exercise 3.24 (page 118).

6. Exercises 3.30 and 3.31 (pages 119–120). In Exercise 3.31(b), it should read, "*How* large must n be ...".

7. Use the normal table on the inside cover of your textbook to complete Exercise 4.3 (page 133). Then use the R function `pnorm` to do the same thing. (Include the R commands in your solution.)

8. For the normal curve described in the previous problem, use the normal table in your textbook to find the 10th, 90th, and 95th percentiles. Then use the R function `qnorm` to do the same thing. (Include the R commands in your solution.)