18. Roulette If you place a bet on the number 7 in roulette, you have a 1/38 probability of winning.

a. Find the mean and standard deviation for the number of wins for people who bet on the number 7 fifty times.

b. Would 0 wins in 50 bets be an unusually low number of wins?

19. Born on the 4th of July For the following questions, ignore leap years.

a. For classes of 30 students, find the mean and standard deviation for the number born on the 4th of July. Express results using seven decimal places.

b. For a class of 30 students, would 2 be an unusually high number who were born on the 4th of July?

20. Powerball Lottery As of this writing, the Powerball lottery is run in 42 states. If you buy one ticket, the probability of winning is 1/195,249,054. If you buy one ticket each week for 50 years, you play this lottery 2600 times.

a. Find the mean and standard deviation for the number of wins for people who buy a ticket each week for 50 years. Express the results using six decimal places.

b. Would it be unusual for someone to win this lottery at least once if they buy a ticket each week for 50 years?

5-4 Beyond the Basics

21. Finding *n*, *p*, *q* In a survey of randomly selected adults, subjects were asked if they could identify at least one current member of the Supreme Court. After obtaining the results, the range rule of thumb was used to find that for randomly selected groups of the same size, the minimum usual number who could identify at least one member of the Supreme Court is 48.0 and the maximum number is 72.0. Find the sample size n, the percentage of surveyed subjects who could identify at least one member of the Supreme Court, and the percentage of subjects who could not identify at least one member of the Supreme Court.

22. Acceptable/Defective Products A new integrated circuit board is being developed for use in computers. In the early stages of development, a lack of quality control results in a 0.2 probability that a manufactured integrated circuit board has no defects. Engineers need 24 integrated circuit boards for further testing. What is the minimum number of integrated circuit boards that must be manufactured in order to be at least 98% sure that there are at least 24 that have no defects?

23. Hypergeometric Distribution A statistics class consists of 10 females and 30 males, and each day, 12 of the students are randomly selected without replacement. Because the sampling is from a small finite population without replacement, the hypergeometric distribution applies. (See Exercise 47 in Section 5-3.) Using the hypergeometric distribution, find the mean and standard deviation for the numbers of females that are selected on the different days.

5-5 Poisson Probability Distributions

Key Concept This chapter began by considering discrete probability distributions in general. Sections 5-3 and 5-4 were devoted to binomial probability distributions, which is one particular category of discrete probability distributions. In this section we introduce *Poisson distributions,* which constitute another category of discrete probability distributions. Poisson distributions are often used for describing the behavior of rare events (with small probabilities).