3.1. Suppose that 20% of the people suffering from a certain disease are cured when treated with a new drug. Use the table of binomial probabilities to find the probability that among 15 randomly selected patients suffering from the disease:

a. exactly 3 will be cured by the treatment.
b. between 1 and 5 (1 and 5 inclusive) will be cured by the treatment.
c. more than 6 will be cured by the treatment.
d. less than 5 will be cured by the treatment.

3.2. A particular analyst claims that he is good at picking “winners” in the US stock market — stocks with annual returns in the top 10 percent of the population of all stocks in the US. You have heard similar stories many times before and you are, of course, very suspicious. However, you are willing to give the analyst a chance. The analyst picks fourteen stocks for you, and a year later four of them are in the top 10%. Assuming that the analyst is really no better than chance (i.e., has a 10% chance of picking a winner), what is the probability of observing exactly four winners in a sample of 14? What is the probability of observing at least four winners?

3.3 **U.S. News & World Report** (July 8, 1996) reported that of the 900 diversified equity funds in existence at the end of 1990, only 14 managed to beat the S&P 500 year in, year out — i.e., only 14 of the 900 equity fund managers were able to outperform the S&P 500 in each of the six years from 1991 to 1996 (note: the 1996 return is through May 31). Assume that each fund manager uses a strategy that is no more sophisticated than the toss of a coin — that is, a fund manager has exactly a 0.5 probability of beating the S&P 500 in any given year, and the fund manager’s performance in any given year is independent of his/her performance in any of the other years. What is then the probability that a fund manager will beat the S&P 500 in six out of six years? Further, based on this probability, how many of the 900 fund managers would you expect to beat the S&P 500 in six out of six years? Would you invest your money in an equity fund?