46. Compute the following binomial probabilities directly from the formula for $b(x; n, p)$.

a. $b(3; 8, .35)$

b. $b(5; 8, .6)$

c. $P(3 \leq X \leq 5)$ when $n = 7$ and $p = .6$

d. $P(1 \leq X)$ when $n = 9$ and $p = .1$
47. Use Appendix Table A.1 to obtain the following probabilities.

a. \( B(4; 15, .3) \)

b. \( b(4; 15, .3) \)

c. \( b(6; 15, .7) \)

d. \( P(2 \leq X \leq 4) \) when \( X \sim \text{Bin}(15, .3) \)

e. \( P(2 \leq X) \) when \( X \sim \text{Bin}(15, .3) \)

f. \( P(1 \leq X) \) when \( X \sim \text{Bin}(15, .7) \)

g. \( P(2 < X < 6) \) when \( X \sim \text{Bin}(15, .3) \)
48. When circuit boards used in the manufacture of compact disc players are tested, the long-run percentage of defectives is 5%. Let \( X \) = the number of defective boards in a random sample of size \( n = 25 \), so \( X \sim \text{Bin}(25, .05) \).

a. Determine \( P(X \leq 2) \).

b. Determine \( P(X \geq 5) \).

c. Determine \( P(1 \leq X \leq 4) \).

d. What is the probability that none of the 25 boards is defective?

50. A particular telephone number is used to receive both voice calls and fax messages. Suppose 25% of the incoming calls involve fax messages, and consider a sample of 25 incoming calls. What is the probability that:

a. At most 6 of the calls involve a fax message?

b. Exactly 6 of the calls involve a fax message?

c. At least 6 of the calls involve a fax message?

d. More than 6 of the calls involve a fax message?
54. A particular type of tennis racket comes in a midsize version and an oversize version. Sixty percent of all customers at a certain store want the oversize version.

a. Among ten randomly selected customers who want this type of racket, what is the probability that at least six want the oversize version?

b. Among ten randomly selected customers, what is the probability that the number who want the oversize version is within 1 standard deviation of the mean value?

c. The store currently has seven rackets of each version. What is the probability that all of the next ten customers who want this racket can get the version they want from current stock?

55. Twenty percent of all telephones of a certain type are submitted for service while under warranty. Of these, 60% can be repaired, whereas the other 40% must be replaced with new units. If a company purchases ten of these telephones, what is the probability that exactly two will end up being replaced under warranty?
60. A toll bridge charges $1.00 for passenger cars and $2.50 for other vehicles. Suppose during daytime hours, 60% of all vehicles are passenger cars. If 25 vehicles cross the bridge during a particular daytime period, what is the resulting expected toll revenue? [Hint: Let $X$ = the number of passenger cars; then the toll revenue $h(X)$ is a linear function of $X$.]

65. Customers at a gas station pay with a credit card ($A$), debit card ($B$) or cash ($C$). Assume that successive customers make independent choices, with $P(A) = .5$, $P(B) = .2$ and $P(C) = .3$.

a. Among the next 100 customers, what are the mean and variance of the number who pay with a debit card? Explain your reasoning.

b. Answer part a for the number among the 100 who don't pay with cash.