

Math/Stat 511 Test #2

Name: _____

Show your work! Answers that do not have a justification will receive no credit.

1. (10 Points) Corn seeds from supplier A have a 90% germination rate and those from supplier B have a 80% germination rate. A package of corn seeds has 70% of its seeds from supplier A and 30% from supplier B. If a seed from this package is planted and germinates, then what is the probability that it came from supplier B?

2. (10 Points) Let X be a random variable so that the the p.d.f. of X is given by

$$f(x) = cx, \quad x = 2, 3, 4.$$

for some constant c .

- (a) Find c

$c =$ _____

- (b) Depict the p.d.f. as a bar graph.

3. (5 Points) In a state lottery a two digit number is chosen at random. If player bets \$1 on a particular number, then he or she wins \$75, otherwise he or she loses \$1. What is the expected payoff for this game?

4. (10 Points) Let X be a discrete random variable with p.d.f.

$$f(x) = \frac{5-x}{10}, \quad x = 1, 2, 3, 4.$$

Find the mean and variance of X .

$$\mu = \underline{\hspace{2cm}}$$

$$\sigma^2 = \underline{\hspace{2cm}}$$

5. (15 Points) Let X be the value of a number chosen at random from the set $\{10, 11, \dots, 20\}$ with all numbers equally likely.

(a) What is the p.d.f. of X ?

(b) What is $P(14 \leq X \leq 18)$?

$$P(14 \leq X \leq 18) = \underline{\hspace{2cm}}$$

(c) What is the expected value of X ?

$$E(X) = \underline{\hspace{2cm}}$$

(d) What is the variance of X ?

$$V(X) = \underline{\hspace{2cm}}$$

6. (10 Points) A bag contains 20 pieces of candy of which 5 are cherry and 15 are grape flavored. If 6 pieces of candy are chosen at random from the bag (without replacement), then what is the probability that exactly 3 are cherry?

7. (20 Points) In a certain state 15% of people do not have auto insurance. A random sample of 10 people is made and the number, X , of people who do not have auto insurance is recorded.

(a) What is the distribution of X . _____

(b) What is the expected number of people in the sample that do not have auto insurance.

(c) Compute the following probabilities.

(i) $P(X \leq 3)$ $P(X \leq 3) =$ _____

(ii) $P(X \geq 4)$ $P(X \geq 4) =$ _____

(iii) $P(X = 2)$ $P(X = 2) =$ _____

8. (15 Points) A student takes a multiple choice test where the probability of his getting a right answer by guessing is $p = .2$. Assume that he guesses on all the questions and that the guesses are independent

(a) What is the probability that his first correct answer is on question 6? _____

(b) What is the probability that his third correct answer is on question 12. _____

(c) What is the probability he gets the first 5 questions wrong? _____

(d) Let X be the number of the question on which he gets his fourth correct answer. Then what are the mean and variance of X .

$$E(X) = \underline{\hspace{2cm}}$$

$$V(X) = \underline{\hspace{2cm}}$$

9. (5 Points) Let X be a random variable with expected value $E(X) = 2$ and variance $\sigma^2 = V(X) = 3$. Then compute $E[X(4 - X)]$

$$E[X(4 - X)] = \underline{\hspace{2cm}}$$