Worksheet: Binomial Distribution

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

C 1. Which of the following is not a property of a Binomial Experiment?
   a. All trials are identical.
   b. Each trial has only two possible outcomes.
   c. The probability of success may change from trial to trial.
   d. The purpose of the experiment is to determine the number of successes that occurs during the n trials.

D 2. In the expression $\binom{8}{3}(0.2)^3(0.8)^5$, which value represents the number of trials?
   a. 2
   b. 3
   c. 5
   d. 8

A 3. In the expression $\binom{7}{2}(0.4)^2(0.6)^5$, which value represents the probability of failure?
   a. 0.6
   b. 0.4
   c. $(0.4)^2$
   d. $(0.6)^5$

A 4. In the expression $\binom{10}{3}(0.5)^3(0.5)^7$, which value represents the number of successes?
   a. 3
   b. 10
   c. 5
   d. 7

____ 5. Which expression describes the probability of k "3s" being rolled on 20 successive rolls of a six-sided die?
   a. $\binom{20}{k}\left(\frac{1}{6}\right)^k\left(\frac{5}{6}\right)^{20-k}$
   b. $\binom{20}{k}\left(\frac{5}{6}\right)^k\left(\frac{1}{6}\right)^{20-k}$
   c. $\binom{20}{k}\left(\frac{3}{6}\right)^k\left(\frac{3}{6}\right)^{20-k}$
   d. $\binom{20}{3}\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^{17}$

____ 6. The probability of a computer memory chip being defective is 0.02. Which of the following statements is true?
   a. In a shipment of 100 chips, two will be defective.
   b. The expected number of defective chips in a shipment of 500 is ten.
   c. In a shipment of 1000 chips, it is certain that at least one will be defective.
   d. All statements above are false.

C 7. A young couple plans to have a family with four children. Assuming that the behaviour of their first child does not cause them to alter their plans, what is the expected number of girls for their family?
   a. 2.5
   b. 2.25
   c. 2
   d. 1.5

Short Answer

Binomial Distribution Practice Worksheet

Part A: Probability Problems

For each of the following, identify the distribution as binomial, then compute the requested probabilities.

1. A die is rolled 6 times. The probability of rolling a "4" on a single roll is $\frac{1}{6}$. Let X = the number of times a "4" is rolled.
2. (a) Find $P(X = 2)$. $= \binom{6}{2}(1/6)^2(5/6)^{6-2} \approx 0.2009$
3. (b) Find $P(X \geq 3)$. $= p(x=3) + p(x=4) + p(x=5) + p(x=6)$
4. A multiple-choice quiz has 10 questions, each with 4 answer choices, and a student guesses on each question. Let X = the number of correct answers.
5. (a) Find $P(X = 5) = \binom{10}{5}(1/4)^5 \cdot (3/4)^{10-5}$ $n=10$ $p=1/4$ $q=3/4$ ≈ 0.0584
6. (b) Find $P(X \leq 2)$. $p(x=0) + p(x=1) + p(x=2)$
7. A lightbulb manufacturer knows that 90% of bulbs work without defects. A sample of 8 bulbs is tested. Let X = the number of bulbs that work. $n=8$ $p=0.9$ $q=0.1$
8. (a) Find $P(X = 8)$. $\binom{8}{8}(0.9)^8(0.1)^{8-8} = 0.4305$
9. (b) Find $P(X \geq 6)$. $p(x=6) + p(x=7) + p(x=8)$
10. In a survey, 70% of people prefer chocolate ice cream over vanilla. If 12 people are asked independently, let X = the number who prefer chocolate.
11. (a) Find $P(X = 9)$.
12. (b) Find $P(X \geq 10)$.
13. A factory machine produces items with a 95% chance of being non-defective. If 15 items are inspected, let X = the number of non-defective items.
14. (a) Find $P(X = 14)$.
15. (b) Find $P(X \leq 13)$.