Binomial Distribution Practice Questions

Instructions

Answer the following questions. Show all your work and calculations.

1. **Basic Formula Usage**

   a) A biased coin has a probability of landing heads of $p = 0.6$. If the coin is flipped 5 times, what is the probability of getting exactly 3 heads?

   b) In a multiple-choice quiz, there are 10 questions, and each question has 4 options, only one of which is correct. A student randomly guesses the answer to every question. What is the probability that the student gets exactly 7 questions correct?

   c) A factory produces light bulbs, and it is known that 2% of the bulbs are defective. A quality control inspector randomly selects 8 bulbs for inspection. What is the probability that exactly 1 of the selected bulbs is defective?

2. **Cumulative Probabilities**

   a) The probability of a customer purchasing a specific product is $p = 0.3$. If a store has 6 customers, what is the probability that at most 2 of them purchase the product?

   b) A basketball player has a free-throw success rate of 75%. In a game, the player attempts 12 free throws. What is the probability that the player makes at least 10 free throws?

   c) A hospital reports that 15% of the patients seen in the emergency room require admission. If 9 patients are seen in a single hour, what is the probability that fewer than 3 of them will require admission?

3. **Mean and Variance**

   a) A car rental company has a fleet of 50 cars. The probability that any single car is rented on a given day is 0.8. What are the expected number of cars rented and the variance of the number of cars rented?

   b) A survey reveals that 40% of people prefer to use social media on their mobile phones. If a random sample of 150 people is selected, what are the mean and standard deviation of the number of people who prefer mobile social media usage?

c) A manufacturer of computer chips finds that the probability of a chip being defective is 0.01. If a batch of 1000 chips is produced, what are the expected number of defective chips and the variance of the number of defective chips?