1. Sample Space and Events: a. A fair six-sided die is rolled. Define the sample space for this experiment. How many outcomes are there? b. Let A be the event of rolling an even number. List the outcomes in event A.
2. Counting Sample Points: a. In how many ways can a committee of 3 people be formed from a group of 8 individuals? b. A password consists of 4 characters, where each character can be a lowercase letter (a-z) or a digit (0-9). How many possible passwords are there?
3. Probability of an Event: a. A bag contains 6 red balls, 4 blue balls, and 5 green balls. If a ball is randomly selected, what is the probability of selecting a blue ball? b. An experiment has 18 equally likely outcomes, of which 5 are favorable to event A. What is the probability of event A?
4. Additive Rules, Conditional Probability, and Independence: a. Two cards are drawn without replacement from a standard deck of 52 cards. What is the probability that the second card drawn is a king, given that the first card drawn was a queen? b. Are the events of rolling a 4 on a fair six-sided die and flipping a head on a fair coin independent? Justify your answer.
5. Random Variables and Probability Distributions: a. Define a random variable and provide an example of a discrete random variable. b. Consider a continuous random variable X that represents the height of a randomly selected person from a population. Describe the probability distribution of X.