

Ch. 16 Probability Models Practice #3

Directions: Read carefully. Use proper notation, and write each answer as a decimal, and percent. Round to the nearest hundredth and nearest percent.

1) What is the difference between geometric and binomial probability models?

2) List the conditions of Bernoulli Trials.

3) Geometric, Binomial, or Neither? Justify your answer with conditions and definitions.

a) There are 20 red marbles, 10 blue marbles, and 5 white marbles in a jar. Select a marble without looking, note the color, and then replace the marble in the jar. We're interested in the number of marbles you would have to draw in order to be sure you have a red marble.

b) Carla makes random guesses on a multiple-choice test, with five choices per question. We want to know how many questions Carla guesses until she gets one correct.

4) Geometric Probability Models (pdf= 1 outcome and cdf=sum of multiple outcomes)

a) The State Department is trying to identify an individual who speaks Farsi to fill a foreign embassy position. They have determined that 4% of the applicant pool are fluent in Farsi. What is the probability that they will find the first Farsi speaking applicant on the 25th interview?

b) Blood type is inherited. If both parents carry genes for the O and A blood types, each child has probability 0.25 of getting two O genes and so of having blood type O. Different children inherit independently of each other. We wish to find the probability that the first child these parents have with type O blood is their third child.

c) The count of children with type O blood among parents that carry genes for both O and the A blood type follows a geometric distribution with $p = 0.25$. Suppose a couple (meeting the above characteristics) plans to have children until they have a child with type O blood. Find the probability the couple has at most 3 children.

d) A basketball player makes 80% of her free throws. We put her on the free-throw line and ask her to shoot free throws until she misses. Let X = the number of free throws the player takes until she misses. What is the probability that the player misses her first free throw within the first 3 attempts?

5) Binomial Probability Models (pdf = x successes out of n trials, cdf = sum of x or fewer successes)

a) A hotel has four elevators. One of them is a freight elevator. When pressing the button, one of the elevators randomly services your floor. If you use the elevators seven times, what is the probability that you use the freight elevator exactly four times?

b) An archer has a 25% chance of hitting the bullseye on a target. What is the probability that the archer will hit the bullseye at most three out of five times?

c) The desks in a classroom are organized into four rows of four columns. Each day the teacher randomly assigns you to a desk. You may be assigned to the same desk more than once. Over the course of six days, what is the probability that you are assigned to a desk in the front row up to four times?

d) An archer has a 25% chance of hitting the bullseye on a target. What is the probability that the archer will hit the bullseye three out of five times?