Assignment

Write

Explain the difference between designing and conducting a simulation that asks for the probability of a specific number of successes in a given number of observations and a simulation that asks for the number of observations until the first success.

Remember

Many events involve very advanced rules for probability. In most cases, a simulation can be used to model the event.

Practice

1. In 1900, half of the babies born in America were born with blue eyes. What is the probability that 3 out of 4 babies born had blue eyes?
   a. What might be a good model for simulating the probability of a baby being born with blue eyes in 1900?
   b. Describe how you would assign outcomes and then describe one trial of the simulation.
   c. Conduct 20 trials of the simulation and record your results in a table.
   d. According to your simulation, what is the probability that 3 out of 4 babies born have blue eyes?

2. By the start of the 21st century, only 1 in 6 babies in America was born with blue eyes. What is the probability that at least 1 out of 2 babies has blue eyes?
   a. What might be a good model for simulating the probability of a baby being born with blue eyes in 2001?
   b. Describe how you would assign outcomes and then describe one trial of the simulation.
   c. Conduct 20 trials of the simulation and record your results in a table.
   d. According to your simulation, what is the probability that at least 1 out of 2 babies born in 2001 has blue eyes?

3. The preferences of customers who rent movies online are given in the table. Design and conduct a simulation for each question. Be sure to describe how you would assign outcomes and what makes up one trial. Conduct 10 trials for each.

Movie Type	Comedy	Drama	Science Fiction	Documentary
Percent of Customers	31%	42%	22%	5%

   a. Determine the probability that out of the next 5 customers to rent a movie, at least 1 rents a science fiction movie.
   b. Determine the number of customers you would expect to rent movies until someone rents a science fiction movie.

Stretch

In this lesson, you have simulated the probabilities from binomial distributions and from geometric distributions. Research each type of probability distribution. Explain the information contained in each problem from the lesson in terms of the parameters of binomial and geometric distributions. Select one of the Activities from the lesson and calculate the theoretical results of each of your simulations.

Review

1. Alison has a set of alphabet tiles. She puts the tiles representing the six letters of her name into a bag. Suppose Alison draws a tile, puts it back, and then draws a second tile.
   a. What is the probability that she draws an A and an N?
   b. What is the probability that she draws an A or an N?

2. A local eatery noticed that there were anywhere from zero to four double yolk eggs in each carton. Today the eatery opened and used 12 cartons of eggs.
   - 8 cartons contained no double yolk eggs
   - 1 carton contained one double yolk egg
   - 1 carton contained two double yolk eggs
   - 1 carton contained three double yolk eggs
   - 1 carton contained four double yolk eggs

   Determine the probability that the next carton of eggs the eatery opens will contain four double yolk eggs.
   a. Design a probability model by creating a table.
   b. What could be a good model for simulating experimental data?
   c. Describe 1 trial of the simulation.
   d. How many trials do you think you would need to conduct for the experimental probability to approach the theoretical probability?

3. Determine each quotient.
   a. $-4\frac{5}{8} \div 5\frac{1}{2}$
   b. $-102.9 \div -3.3$