

## Lesson 32: Simulation

### TERMS

#### Simulation

A simulation is an imitation of chance behavior. Many times this is carried out with random numbers.

Example 1: How likely is it that a fair lottery would result in 5 female and 3 male pilots being selected from an initial pool of 15 male and 10 female pilots?

Method:

Example 2: What's the probability that three of the seven people show buy a 20-oz bottle of soda win a prize if each bottle has a  $\frac{1}{6}$  chance of saying "You are a winner?"

Method:

### Daily Data Collection

A city is 60% white and 40% minority. The city council is to appoint a task force to solve the sewer rat situation. The city council randomly selects 8 people to serve on the task force. Many people feel that the process was biased because 6 of the 8 people selected were white. Create a simulation and use the results to construct a conclusion about if the process was rigged.

**The class will split into 10 groups. Each group will simulate the situation and report the results.**

Trial	1	2	3	4	5	6	7	8	9	10
Success count										
Probability										

**Conclusion:**

## CHECK YOUR UNDERSTANDING

1. According to the “Book of Odds,” the probability that a randomly selected U.S. adult usually eats breakfast is 0.61.

(a) Explain what probability 0.61 means in this setting.

(b) Why doesn't this probability say that if 100 U.S. adults are chosen at random, exactly 61 of them usually eat breakfast?

2. Probability is a measure of how likely an outcome is to occur. Match one of the probabilities that follow with each statement. Be prepared to defend your answer.

0   0.01   0.3   0.6   0.99   1

(a) This outcome is impossible. It can never occur.

(b) This outcome is certain. It will occur on every trial.

(c) This outcome is very unlikely, but it will occur once in a while in a long sequence of trials.

(d) This outcome will occur more often than not.

## Chance variation or skill?

Is there such a thing as a “hot hand” in basketball? Belief that runs must result from something other than “just chance” influences behavior. If a basketball player makes several consecutive shots, both the fans and her teammates believe that she has a “hot hand” and is more likely to make the next shot. This is wrong. Careful study has shown that runs of baskets made or missed are no more frequent in basketball than would be expected if each shot is independent of the player's previous shots. If a player makes half her shots in the long run, her made shots and misses behave just like tosses of a coin—and that means that runs of makes and misses are more common than our intuition expects.<sup>3</sup>

Belief in this phony “law of averages” can lead to serious consequences. A few years ago, an advice columnist published a letter from a distraught mother of eight girls. It seems that she and her husband had planned to limit their family to four children. When all four were girls, they tried again—and again and again. After seven straight girls, even her doctor had assured her that “the law of averages was in our favor 100 to 1.” Unfortunately for this couple, having children is like tossing coins. Eight girls in a row is highly unlikely, but once seven girls have been born, it is not at all unlikely that the next child will be a girl—and it was.

*\*\*Look at Question 25 together\*\**

**HW 32 - Section 5-1: 15, 17, 19, 23, 25, 31-36**