Chapter 6

AP Stat

Simulations: Imitation of chance behavior based on a model that accurately reflects a situation

Cards, dice, random number generator/table, etc

When Performing a Simulation:

1. State the question/Problem of interest.

2. Explain how you plan on executing a simulation (in detail) that will match the chance behavior being investigated. Include how many repetitions, what corresponds to what, and so on

3. Perform the Simulation. Display results (graphs, etc).

4. Use the results to answer the question of interest.

AP note: On the AP, students may receive full credit on a question using a simulation even if the problem does not call for it. This is why it is a good thing to know/study

***AP exam common error:** When working with a random digit table, be sure to clearly communicate your method that you are using. You need to use the same length digits: EX: labeling 1500 items, use 0001,0002,......1500.(use 4 digits consistently.*

Example:

At a (college) department picnic, 18 students in mathematics/statistics department decide to play a softball game. Twelve of the 18 students are math majors. 6 are statistics majors. To divide into two teams of 9, one of the professors put all the players names in a hat and drew out 9 players to form a team. The players were surprised that one team was made up of entirely math majors. Is it possible that the names weren't adequately mixed in the hat, or could this happen by chance? Design and carry out a simulation to help answer this question.

State Problem/Question: What is the probability for a team of 9 to be entirely M.M. w/ 12 MM and 6 SM. Being drawn from a hat

Plan: Put 18 pieces (equal) of paper w/ 12 M
(include how many trials) and 6 S folded into a cup
dump the cup & split into 2 piles
of 9

Do:

Results/Conclusion with sim showing 0% chance of getting all m.M., That it calls the hat mix questionable

Example:

In an attempt to increase sales, a breakfast cereal company decides to offer a NASCAR promotion. Each box of cereal will contain a collectable card featuring one of these NASCAR drivers: Jeff Gordon, Dale Earnhardt Jr., Tony Stewart, Danica Patrick, or Jimmie Johnson. The company says that each of the five cards is equally likely to appear in any box of cereal. A NASCAR fan decides to keep buying boxes of cereal until she has all 5 drivers' cards. She is surprised when it takes her 23 boxes to get the full set of cards. Should she be surprised? Design and carry out a simulation to help answer the question. (use rand # generator)

State question: whats the probability that it will take 23 or more boxes of cereal to get all 5 cards?

Plan (include details): rand Int #'s 1–5. one trial is complete when # 1–5 appear

rand Int (1, 5)   3 2 1 4 3 5 = 6

Do: (include graphical rep)

Conclusion: After 159 trials, ≈ 10% showed having to buy more than 23 Boxes. This is a low chance, so yes, she should be suprised