**AP Statistics Guided Notes: Chapter 5.1**

Terminology

* The Law of Large Numbers:
* Probability:
* Simulation:

**Performing a Simulation**

**STATE:** What is the question of interest about some chance process?

**PLAN:** Describe how to use a chance device to imitate one repetition of the process. Explain *clearly* how to identify the outcomes of the chance process and what variable to measure.

**DO:** Perform many repetitions of the simulation.

**CONCLUDE:** Use the results of your simulation to answer the question of interest.

**Example Simulation:** “1 in 6 wins” Game

**STATE:** What’s the probability that three of seven people who buy a 20-ounce bottle of soda win a prize if each bottle has a 1/6 chance of saying, “You’re a winner!”?

**PLAN:** Use a six-sided die to determine the outcome for each person’s bottle of soda.

6 = wins a prize, 1 to 5 = no prize

Roll the die seven times, once for each person. Record whether three or more people win a prize (yes or no).

**DO:** Each student should perform 5 repetitions.

**CONCLUDE:** Out of 75 repetitions of the simulation, there was one time when three or more of the seven people won a prize. Our estimate of the probability is 1/75, or about 1.3%.

Myths about probability

* Myth of short-run regularity:
* Myth of the “law of averages:”

You try!

1. In the United Kingdom’s Lotto game, a player picks six numbers from 1 to 49 for each ticket. Rosemary bought one ticket for herself and one for each of her four adult children. She had the lottery computer randomly select six numbers on each ticket. When the six winning numbers were drawn, Rosemary was surprised to find that none of these numbers appeared on any of the five Lotto tickets she had bought. Should she be? Design and carry out a simulation to answer this question.

STATE: What’s the probability that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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PLAN: Pick 6 numbers from \_\_\_\_ to \_\_\_\_\_ to be the winning numbers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Then, using technology, pick 6 two-digit numbers from \_\_\_ to \_\_\_ for each of the five tickets. There cannot be repeats within a ticket, but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Record \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

DO: Carry out \_\_\_\_\_\_\_\_ repetitions of the simulation for buying five tickets.

CONCLUDE: Based on our \_\_\_\_\_\_\_ samples, the probability of having at least one match in a set of five tickets is \_\_\_\_\_ / \_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_%. Rosemary (circle one) should / should not be surprised to find no winning numbers on five tickets.