Name_____ AP Statistics Date_____

Notes - Probability

The idea of probability is empirical. That is, it is based on evidence rather than theory.

Chance behavior is unpredictable in the short run but has a regular and predictable pattern in the long run.

We call a phenomenon **random** if individual outcomes are uncertain but there is nonetheless a regular distribution of outcomes in a larger number of repetitions.

Randomness requires **independence** amongst trials. In other words, the result of the previous trial or trials has no effect on the result of the current trial.

The **probability** of any outcome of a random phenomenon is the proportion of times the outcome would occur in a very long series of repetitions.

Thus, probability is a measure of how likely an event is to occur. Probabilities range from zero to one, inclusive. If an event has a probability of zero the event is impossible. It can never occur. On the other hand, if and event has a probability of one it is certain to occur on every trial.

The **sample space** of a random phenomenon is the set of all possible outcomes of a trial.

An **event** is any outcome or a set of outcomes of a random phenomenon.

A **probability model** is a mathematical description of a random phenomenon consisting of a sample space and a way of assigning probabilities to events.

Multiplication Principle – If you can do one task in *a* number of ways and a second task in *b* number of ways, then both tasks together can be done in *ab* number of ways.

Activity: The Spinning Wheel

Imagine a spinner with three equal-sized sectors labeled 1, 2, and 3. We will program the TI-83 to implement an experiment. The experiment will consist of spinning the spinner three times and recording the numbers as they occur (e.g. 132). We want to determine the proportion of times that at least one digit occurs in its correct position.

The sample space for this random phenomenon is the set of all possible outcomes of a trial.

So, S =

Programming the calculator:

Create a new program and call it SPIN123

:ClrHome	(PRGM, I/O)
:ClrList L_1, L_2	(STAT, EDIT)
:Disp "HOW MANY TRIALS?"	(PRGM, I/O)
:Prompt N	(PRGM, I/O)

$L_1(3) = 3$

:$1 \to C$
:While $C \leq N$ (2^{nd} TEST)
:randInt(1,3,3)$\to L_1$ (MATH, PRB)
:$(L_1(1) = 1$ or $L_1(2) = 2$ or [illegible]$) \to L_2(C)$ (MATH PRB)
:$1 + C \to C$
:End (PRGM, CTL)
:Disp "REL FREQ="
:Disp sum($L_2 = 1$)/N

When you have finished writing the program, run it with N = 200. We will then combine class data to find an estimate for the true proportion.

Your proportion: Class proportion:

HW – 6.12, 6.14, 6.17