Name/Date: __________**KEY**____________________ AP Statistics Unit 3 HW #3.11A

1) **Birth defects.** The American College of Obstetricians and Gynecologists says that out of every 100 babies born in the United States, 3 have some kind of major birth defect. How would you assign random numbers to conduct a simulation based on this statistic?

Answers may vary. Generate two-digit random numbers, 00-99. Let 00-02 represent a defect. Let 03-99 represent no defect.

2) **Colorblind.** By some estimates, about 10% of all males have some color perception defect, most commonly red–green colorblindness. How would you assign random numbers to conduct a simulation based on this statistic?

Answers may vary. Generate random digits 0-9. Let 0 represent colorblind. Let 1-9 represent no color perception defect.

3) **Election.** You're pretty sure that your candidate for class president has about 55% of the votes in the entire school. But you're worried that only 100 students will show up to vote. How often will the underdog (the one with 45% support) win? To find out, you set up a simulation.
a) Describe how you will simulate a component.

Answers will vary. A component is one voter voting. An outcome is a vote for our candidate. Using two random digits, 00-99, let 01-55 represent a vote for your candidate, and let 55-99 and 00 represent a vote for the underdog.

b) Describe how you will simulate a trial.

A trial is 100 votes. Examine 100 two-digit random numbers and count how many simulated votes are cast for each candidate. Whoever gets the majority of the votes wins the trial.

c) Describe the response variable.

The response variable is whether the underdog wins or not. To calculate the experimental probability, divide the number of trials in which the simulated underdog wins by the total number of trials.

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4) **The family.** Many couples want to have both a boy and a girl. If they decide to continue to have children until they have one child of each sex, what would the average family size be? Assume that boys and girls are equally likely. Use at least 10 trials.

*Use the *Table of Random Digits*

Answers will vary. Each child is a component. One way to model the component is to generate random digits 0-9. Let 0-4 represent a boy and let 5-9 represent a girl. A trial consists of generating random digits until a child of each gender is simulated. The response variable is the number of children simulated until this happens. The simulated average family size is the number of digits generated in each trial divided by the total number of trials. According to the simulation, the expected number of children in the family is about 3.

*Use the *Table of Random Digits*

Each child is a component. one way to model the component is to generate random digits 0 – 9. Let 0 – 4 represent a boy and let 5 – 9 represent a girl. A trial consists of generating random digits until a child of each gender is simulated. The response variable is the number of children simulated until this happens.

Trial		# of children before 1 boy & 1 girl
1	962	3
2	990	3
3	71	2
4	969864	6
5	2206	4
6	39	2
7	2318	4
8	5562	4
9	82	2
10	6992	4

average family size.

$\frac{34}{10} = \boxed{3.4}$