For each of the following problems, be sure to clearly explain how you conducted your simulation. Tell which numbers were assigned to each outcome and the results of each trial of your simulation.

1. Some parents want at least 2 girls. Assuming that boys and girls are equally likely, how many children, on average, must a couple have before they end up with at least 2 girls. Run a simulation of 20 trials to estimate the number of children a couple must have to have at least one boy and at least one girl. Seed your calculator at 1234 and start running your simulation.

a. What are the possible outcomes of a trial? Outcomes are 2 children, 3 children, 4 children, etc. It is unlikely that any simulation would produce more than 6 or 7 children, but it is possible. (See trial #1 below!)

b. What digits did you assign to each event? Let 0 – 4 represent boys, 5 – 9 represent girls. (There are many other possibilities such as odds represent boys, evens represent girls, etc.) Digits must be divided 50%-50%.

c. Show the results of 20 trials below. Fill in the result of each simulated trial and the number of children that result. I used "randInt(0,9,1)" to pull one single digit at a time. Stop when you have two digits from 5-9.

	Outcome	# Children
Trial #1	0, 1, 0, 0, 3, 7, 7 (BBBBBGG)	7
Trial #2	4, 9, 5 (BGG)	3
Trial #3	3, 0, 1, 1, 8, 8 (BBBBGG)	6
Trial #4	6, 8	2
Trial #5	3,8,4,2, 2, 8	6
Trial #6	0, 1, 2, 6, 3, 4, 5	7
Trial #7	8, 3, 5	3
Trial #8	6, 6	2
Trial #9	7, 1, 9	3
Trial #10	9, 2, 9	3

	Outcome	# Children
Trial #11	0, 1, 0, 7, 3, 6	6
Trial #12	5, 8	2
Trial #13	4, 5, 3, 9	4
Trial #14	2, 5, 5	3
Trial #15	6, 6	2
Trial #16	2, 3, 1, 8, 6	5
Trial #17	0, 5, 4, 1, 9	5
Trial #18	6, 8	2
Trial #19	3, 7, 2, 4, 9	5
Trial #20	1, 9, 2, 1, 4, 8	6

d. Based on your simulation, what is the approximate number of children a couple must have to ensure they have at least 2 girls? The average of # of children is about $\frac{82}{20}$ which is about 4.1

2. Sully is interested in investigating so-called hot streaks in foul shooting amongst basketball players. He's a big fan of Andy, who has been making approximately 84% of his free throws. Specifically, Sully wants to use simulation methods to determine Andy's longest run of baskets on average, for 15 consecutive free throws. Run a simulation of at least 20 trials to estimate the answer.

Let the numbers 1 through 84 represent a "make" and then 85 through 100 represent a miss. Then simulate 15 shots by using the command "Randint(1, 100, 15) → L1".

Keystrokes for updated TI84. [math] [▶] [▶] [▶] [5] [1] [▼] [1] [0] [0] [▼] [1] [5] [▼] [enter] [sto→] [2nd] [1] [enter]

This will select 15 random integers from 1 to 100 and store them in L1. After pushing enter, go into the list L1 and exam the 15 integers. Look for the longest string of consecutive numbers less than or equal to 85 and record that number.

Repeat for a total of 20 times. Answers will vary. I got $\frac{182}{20}$ which is 9.1 Your answer will be different, but should be relatively close to 9.1.

Trial 1: 9	Trial 6: 6	Trial 11: 8	Trial 16: 8
Trial 2: 13	Trial 7: 8	Trial 12: 5	Trial 17:10
Trial 3: 6	Trial 8: 12	Trial 13: 15	Trial 18: 15
Trial 4: 11	Trial 9: 5	Trial 14: 15	Trial 19: 6
Trial 5: 9	Trial 10: 8	Trial 15: 9	Trial 20: 4

3. Bean likes flipping coins. Suppose Bean flips a coin 25 times. What is the longest number of consecutive heads he can expect? Run a simulation of at least 20 trials to estimate the answer.

This is very similar to #2. I would select random integers from 0 to 1. Let a 0 represent "Heads" and a 1 represent "Tails".

Use "Randint(0, 1, 25) → L1".

Look through the list for longest string of consecutive 0s.