Law of Large Numbers:
The long-run relative frequency of repeated independent events approaches the TRUE probability of that event.

Law of Averages: what gets people in trouble at casinos (this "law" does not actually exist).

Position	feet	snout	back	side (dot)	side (no dot)	ear-snout	leaning back
Probability	0.10	0.03	0.33	0.27	0.26	0.01	0

Ex 1. **Rolling Pigs.** Find each of the following probabilities (round to 4 decimal places if necessary).

1. If we roll one pig, what is the probability of rolling a "snout" OR "side (dot)"? **(ADDITION RULE)**

2. If we roll a pig twice, what is the probability that it lands on "back" both times OR "side (no dot)" both times?

3. What is the probability of rolling "feet" four times in a row?

4. If we roll a pig 14 times, what is the probability that we get exactly 6 OR 7 rolls that land on "feet"?

5. If we roll a pig 14 times, what is the probability that it lands on its feet **AT LEAST ONCE**?

6. What is the expected number of rolls that it would take in order to get our first "ear-snout"?

7. Suppose we take 400 rolls of the pig dice. What is the expected value and standard deviation for the number of rolls that land "ear-snout"?

Ex 2. **Red-green colorblindness** is a condition that affects about 6% of the male population. For this problem, assume that the probability that a randomly selected male is red-green colorblind is exactly 0.06.
Find each probability:

1. Two males are chosen at random; the first **is** colorblind and the 2nd **is not**.

2. If we randomly select males one after another, what is the probability that the first colorblind male occurs on the 20th person that we select?

3. In an AP Statistics class, there are 12 males. Find the probability that **<u>at least one</u>** male student is colorblind.

4. In a random sample of 12 male students, what is the expected value and standard deviation for the number of colorblind people?

5. How many males do you expect to sample in order to find the first colorblind person?

Ex 3. **The 8th grader problem** An algebra II class has 5 ninth-graders, 17 sophomores, and 3 eighth graders.

1. If you select one student at random, what is the probability that you will select an 8th grader?

2. If you select a group of 3 students from this class, what is the probability that you pick <u>only</u> freshmen?

3. If you select two students at random from this class, what is the probability that both are ninth-graders OR both are sophomores?