Pre-class reading:

Students were expected to be familiar with this material, and come prepared to use this information in class

When different outcomes of an event are equally likely, you can use the following formula to calculate the probability of outcomes:

$$P(A) = \frac{\text{number of ways outcome A can occur}}{\text{total number of ways any outcome can occur}}$$

For example, getting a head when you toss a coin has a ½ chance because there are two possible outcomes that are equally likely (heads or tails) and a heads is just one of the possible outcomes.

When you want to calculate the probability of multiple independent events will occur, you calculate them by multiplying the probabilities of each independent event. For example, the chance of throwing a heads four times in a row is ½ * ½ * ½ * ½ = 1/16

In-class problems:

1. What is the probability that you roll the same number on a six-sided die three times in a row?
   A: 1/36 because the first time you roll the die you are not constrained by which number you roll, so your chances of rolling any number are 6/6, or 100%. The second and third roll, though, you need to roll the same number as the first and therefore your chances on each of those rolls is 1/6. To determine the overall chance of rolling the same number 3 times, you just need to multiply all three of these probabilities together, 1 * 1/6 *1/6 = 1/36

2. Do you think you can tell the difference between a real set of data and a faked set of data?
   a. Pretend that you are flipping a coin 20 times. Record what you would imagine is a possible set of a results for each of the 20 flips.
      A: results will vary
   b. Now find a coin and flip it 20 times and record your actual results.
      A: results will vary
   c. Do you notice anything different about your two sets of data- the real one and the fake one? Do you think you could distinguish real from faked data in the future?
      A: In general faked data is closer to the theoretical probability and has a more regular pattern than real data. For example, in faked coin toss data, you will likely have almost exactly 50% heads (H) and 50% tails (T) and see the pattern of HTHT more often than you would if it were real data. Everyone might not be able to see this in their data (especially if their actual data is patterned by chance).