Refer to the syllabus for instructions on how to complete this assignment. Questions marked with *** denote that a teacher solution is required.

1. Of Tracy, Mark, Emilio, and Percy, two will be randomly chosen for a committee.
   (a) Give a sample space for this experiment so that each outcome is equally likely, taking order into account. (Taking order into account means that in this scenario, choosing Tracy then Mark is considered a different outcome than choosing Mark then Tracy.)
   (b) Give another sample space with equally likely outcomes in which order is not taken into account.
   (c) Find the probability that Mark and Emilio are selected, in either order.
   (d) Find the probability that Percy is not selected.
   (e) Find the probability that Tracy is the first person selected.
   (f) Discuss whether it was important to take order into account. “It depends,” is a valid way to start!

2. Suppose you roll two fair 6-sided dice. Find the probability of the following events. You may use a sample space or either of our models. You need only write or draw your sample space/model once and may then refer back to it as needed.
   (a) you get doubles
   (b) your two rolls are different
   (c) the sum of the two numbers is even
   (d) the product of the two numbers is even
   (e) the sum is 12
   (f) the sum is 6

3. *** You have forgotten your (4 digit, with each digit in 0-9) PIN and have decided to guess it randomly at the ATM. Find the probability of guessing it correctly given the following three scenarios. Hint: think about how you could model this using a tree, even if you do not draw out the whole tree for each scenario.
   (a) If you don’t remember any of the numbers?
   (b) If you remember only the first two numbers?
   (c) If you remember that it contains a 2, a 1, a 4, and a 9, but not their order?

4. A die is rolled at the same time that a coin is tossed.
   (a) Write a sample space in which the outcomes are equally likely. Explain why they are, in fact, equally likely.
(b) Make a tree diagram or an area model for the situation.

(c) Find the probability of getting an outcome in which the die’s number is divisible by 3 and the coin is heads. Explain or illustrate how you can get this answer using the sample space and your model.

5. Answer the following.

(a) If I flip a fair coin 4 times in a row, what is the probability that all four flips come up heads?

(b) If I flip a fair coin 4 times in a row, is it more likely that I will get a total of exactly 4 heads or a total of exactly 2 heads?

(c) Without calculating the probabilities explicitly, if I flip a fair coin 10 times in a row, which outcome is more likely: HHHHHHHHHH, or HTTHTTHTHTH (by which I mean the first flip is a head, the second tails, etc)? Why?

(d) Now actually calculate the probabilities of the outcomes in c).

6. Read through the Common Core Standards for Probability for grade 7 (available at http://www.corestandards.org/Math/). Then:

(a) Explain, as if to a student, why, as in 7.SP.6, we expect to see the event ‘3 or 6’ approximately 200 times, but probably not exactly 200 times.

(b) Write out a solution to the italicized problem in 7.SP.8. Hint: start with one donor. Then move to two donors and draw a tree model.