Homework 9 – Due Friday 4/26

1. Suppose you roll a 6-sided die 6 times.

   a. How many different (equally likely) outcomes are possible?
   b. What is the probability that all of the rolls show either 1, 2, or 3?
   c. What is the probability that all of the rolls show the same value?
   d. What is the probability that all of the rolls show unique values (none of them match)?
   e. What is the probability that the first two rolls match, the second two rolls match (and are different from the previous ones) and that the last two rolls match (and are different from any of the previous ones)?

2. [30 pts.] **For this question, please leave your answer in "choose" notation** – please do not write any factorials or simplify in any way.

   The pet store has 6 puppies, 9 kittens, 4 lizards, and 5 snakes.

   a. If you select a pet from the store randomly, what is the probability that it is a snake?
   b. If you select two pets from the store randomly, what is the probability that they are both the same species?
   c. If you select five pets from the store randomly, what is the probability that at least one of the pets is a puppy?

3. [30 pts] **Again, please leave your answer in choose notation and don't simplify!**

   There are 15 dogs in an obedience class. Five of the dogs are Dalmatians. Aside from that, the rest are all different breeds. Assume that the instructor can only distinguish between the dogs by their breeds. (In other words, he can't tell the Dalmatians apart!) At the beginning of class all of the dogs are lined up in a row.

   a. As far as the instructor can tell, how many ways can the dogs be lined up in a row? (Remember, the Dalmations are indistinguishable.)
   b. Assume that the dogs are given sweaters that completely disguise what breed they are. 3 wear yellow sweaters, 4 wear red sweaters, 3 wear blue sweaters, and 5 wear green sweaters. At this point, the instructor can only distinguish between the dogs by their sweater colors. (In other words, all the dogs with the same color sweater look alike to him!) As far as the instructor can tell, how many ways can the dogs be lined up in a row? (You may assume that the dogs will wear the sweaters without objection.)
   c. Assume the sweater scenario in part (b). What is the probability that the instructor sees all of the dogs with the same sweater color sitting next to each other (for example: RRRRYYYGGGGGBBB)?