STAT/MA 41600
In-Class Problem Set #4: August 29, 2018

1. Consider the five regular kinds dice that come in the shapes of Platonic solids, namely: a 4-sided die (tetrahedron), a 6-sided die (cube), an 8-sided die (octahedron), a 12-sided die (dodecahedron), and a 20-sided die (icosahedron). Audrey has one die of each type. She selects one of the dice at random from her bag of dice (all are equally likely to be chosen), and when she rolls it, the value 10 appears. What is the conditional probability that the die Audrey selected was the dodecahedron?

2. Consider a standard deck of 52 cards (13 possible values, 4 suits of each). Alice and Bob are each dealt five cards at random, without replacement between cards, and also without replacement between the two people.

2a. In a flush, all 5 cards have the same suit.

Given that Alice receives a flush, what is the conditional probability that Bob receives a flush too?

2b. In a (new type of) full house, let's say that 3 cards have the same suit, and 2 cards have the same suit; assume that a flush does not count as a full house, i.e., the two suits must be different.

Given that Alice receives a full house, what is the conditional probability that Bob receives a flush?

3. Consider five 4-sided dice that are each painted, without numbers:

One has all 4 sides painted blue;
one has 3 sides painted blue and 1 side painted white;
one has 2 sides painted blue and 2 sides painted white;
one has 1 side painted blue and 3 sides painted white;
one has all 4 sides painted white.

A die is selected at random (with all 5 dice equally likely). When it is rolled, a blue side is selected. What is the conditional probability that the all-blue die is the one that was selected?

4. Mary draws bears (with replacement) from a bin with equal numbers of bears of six colors, until she gets the first purple or orange bear, and then she stops afterwards.

Suppose that the first bear that is purple or orange appears on the 4th draw. What is the conditional probability that:

4a. The first three draws have 0 blue bears?
4b. The first three draws have 1 blue bear?
4c. The first three draws have 2 blue bears?
4d. The first three draws have 3 blue bears?