

STAT/MA 41600  
In-Class Problem Set #3: August 29, 2016

**1.** In the dining hall at dinnertime, suppose that 30% of students prefer a salad-&-soup for their entree, 45% prefer a meat dish, and 25% want pancakes as a new option called breakfast-for-dinner.

We ask students about their preferences as they enter the dining hall, and we assume that their preferences are independent.

**1a.** What is the probability that the first four students each prefer traditional meals, e.g., salad-&-soup or meat (but not breakfast-for-dinner).

**1b.** Suppose that we ignore people who like the new pancake option, and we wait until we find the first person who prefers one of the two traditional options. What is the probability that this person prefers salad-&-soup, rather than a meat dish?

**2.** We deal one card at a time from a traditional deck of 52 cards, with replacement of the card back into the deck—and also shuffling—in between each deal. We continue in this fashion until the first J, Q, or K appears.

**2a.** What is the probability that it takes strictly less than 5 attempts to do this, i.e., that we get our first J, Q, or K within the first 4 attempts?

**2b.** What is the probability that it takes exactly 5 attempts to do this?

**2c.** Solve **2a** again, but without replacing and shuffling the cards in between each deal.

**2d.** Solve **2b** again, but without replacing and shuffling the cards in between each deal.

**3.** Roll 3 dice (6-sided) until the sum of the dice equals 7 or larger, and then stop. What is the probability that the sum is exactly 7 on this final role? (Hint: It might be helpful to use the solution to question #5 from the “Practice Problems” on Day 1 of class.)

**4.** Roll a (6-sided) die. Let  $A$  be the event that the outcome on the die is an odd number. Let  $B$  be the event that the outcome on the die is 3 or smaller. Let  $C$  be the event that the outcome on the die is 4 or smaller.

**4a.** Are  $A$  and  $B$  independent?

**4b.** Are  $B$  and  $C$  independent?

**4c.** Are  $A$  and  $C$  independent?