

Your name(s):

DAY 2: COUNTING AND CONDITIONAL PROBABILITY
SEC 1.1-1.3

1. There are 68 students in this class.
 - (a) How many standing arrangements are possible if all students are waiting in line at the coffee machine at 7:45AM?
 - (b) What is the probability that we pick on you to answer a random question? Call this event X .
 - (c) What is $P(X')$?
 - (d) What is the probability that we pick on your best friend in class to answer the aforementioned random question? Call this event Y .
 - (e) You know we can only call on one person for a specific question. What is $P(X \cap Y)$? What is $P(X \cup Y)$? What is $P(X|Y)$? Explain your answers using mathematical formulas from your reading and also using common sense.
2. Olin loves committees. If we assume that Olin has $n = 300$ students, how many different committees of size $r = 4$ are possible?
3. How many ways can 40 distinguishable balls be placed into 365 distinguishable bins, so that no bin has more than one ball?
4. Every year the Olin student body (assume again 300 students) elects a slate of officers for CoRE. Suppose we consider four elected positions: P, VP, T, C. How many ways can these elected positions to be filled, assuming that any student can fill any one position?
5. How many five-card poker hands are possible from a standard deck of cards? How many of these hands have four diamonds? What is the probability of getting a poker hand with four diamonds?
6. You are rolling a fair die while blindfolded. What is the probability that you rolled a 2, given that you are told you rolled an even number? Explain with mathematical formulas (define events as necessary) and common sense.
7. On day 1, what was the probability that you flipped your 5th head on exactly the 10th flip? Explain with mathematical formulas (define events as necessary) and common sense.
8. A pediatrician wishes to recruit 5 couples, each of whom is expecting their first child, to participate in a new natural childbirth regimen. Suppose that the probability that a randomly selected couple agrees to participate is 0.2. What is the probability that she needs to ask exactly 15 couples before 5 are found who agree to participate?