CSE 312: Foundations of Computing II
Additional Problems #3: Introduction to Probability

1. Suppose Joe is a k-legged robot, who wears a sock and a shoe on each leg. Suppose he puts on k socks and k shoes in some order, each equally likely. Each action is specified by saying whether he puts on a sock or a shoe, and saying which leg he puts it on. In how many ways can he put on his socks and shoes in a valid order? We say an ordering is valid if, for every leg, the sock gets put on before the shoe. Assume all socks are indistinguishable from each other, and all shoes are indistinguishable from each other.

2. Given 3 different spades and 3 different hearts, shuffle them. Compute $\mathbb{P}(E)$, where E is the event that the suits of the shuffled cards are in alternating order. What is your sample space?

3. Novice poker players are often confused about which player wins if one holds a flush and one holds a straight. For draw poker (see quiz section #1 worksheet, exercise #25):

   (a) Compute the probability of being dealt a flush.

   (b) Compute the probability of being dealt a straight.

   (c) Which of these hands should win, given your answers to (a) and (b)?

4. Suppose you deal 13 cards from a well-shuffled bridge deck (4 suits with 13 cards in each). What is the probability that the distribution of suits is 4, 4, 3, 2? (That is, you have 4 cards of one suit, 4 cards of another suit, 3 cards of another suit, and 2 cards of the last suit.)

5. (Challenge problem) n people at a reception give their hats to a hat-check person. When they leave, the hat-check person gives each of them a hat chosen at random. What is the probability that no one gets their own hat back?