MATH 323 - Tutorial 2 Questions
Counting Spaces

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1. a) A lottery ticket is comprised of 6 unique numbers from the set $\{1, 2, \ldots 44\}$. Suppose that the winning ticket is drawn randomly without replacement. If you buy a single ticket, what is the probability that it is the winning one.

b) Now suppose that the lottery is ordered. It is not enough to get the right numbers, but must get the correct ordering. Find the probability of a single ticket being the winning one.

c) In addition to being ordered, the now suppose that the lottery is drawn with replacement. Find the probability of a single ticket being the winning one.

2. The letters in the word lollipop are randomly rearranged. What is the probability that after the rearrangement, it still spells lollipop?

3. A gym class is made up of 20 students. In the gym class there are 4 students playing badminton, 8 people playing dodgeball, 5 playing basketball, and 3 sitting out. Suppose that each person in the class has 1 preferred group and in this class exactly 4 prefer badminton, 8 prefer dodgeball, 5 prefer basketball and 3 prefer sitting out. If the teacher randomly makes the groupings, what is the probability that each student gets their preferred option?

4. A committee of $n = 5$ students is to be selected, supposedly at random from a class of $N = 200$. The class is made up of 120 science students and 80 arts students.

a) What is the probability if the selection was random that all 5 members of the committee are sciences students?

b) What is the probability that at least 3 of the 5 members of the committee are science students?

5. Challenge Question: 2 players are playing cards from a standard deck of 52 (13 hearts, 13 spades, 13 diamonds, 13 clubs). What is the probability that the first player is dealt exactly n_1 hearts ($n_1 \in \{n : n \in \mathcal{N}, 0 \leq n \leq 13\}$) and the second player is dealt exactly n_2 hearts ($n_2 \in \{n : n \in \mathcal{N}, 0 \leq n \leq 13\}$), where $n_1 + n_2 \leq 13$.