

Math Circles - Intro to Combinatorics - Winter 2024

Problem Set 1

February 7th, 2024

1. How many licence plates that are seven characters long can you make using only letters and digits? What if we require a letter as the first character?
2. Suppose you are a wedding photographer. If a wedding party has 6 people, including the bride and groom, then how many ways can we arrange the photo if
 - (a) the bride is next to the groom?
 - (b) the bride is not next to the groom?
 - (c) the bride is to the left, but not necessarily next to, the groom?
3. How many ways can a group of four people be chosen from a group of 8 adults and 5 children if the groups must have two adults and two children?
4. How many different card hands in poker are a flush? A deck of cards has 52 cards, with four suits, and a flush is a set of five cards all of the same suit.
5. How many solutions, using natural numbers (positive numbers) and zero are there to the equation $x + y + z = 20$?
6. How many words would you have to write, in any language using the 26 letter alphabet we use in English, before you have written two words that have the same first and last letter? We assume many words with every first and last letter pair exist.