



Intermediate Math Circles
October 11, 2017
Counting I
Problem Set

1. A restaurant menu lists 5 meat dishes and 3 fish dishes.
 - a.) How many single course dinners can you order?
 - b.) How many dinners can you order that have 1 meat dish and 1 fish dish?

2. How many numbers between 1000 and 9999 have only even digits?

3. A licence plate consists of 4 letters followed by 3 digits. How many different license plates are possible?

4. How many 3 digit numbers are there in which adjacent digits are not the same?

5. In how many ways can 6 people seat themselves in a room with 9 chairs where at most 1 person can sit in each chair?

6. How many permutations of the numbers 1, 2, 3, 4, 5, and 6:
 - a.) begin with an even number?
 - b.) begin with an odd number and end with an even number?
 - c.) begin with an odd number and end with an odd number?

7. How many permutations of the numbers 1, 2, 3, 4, 5, 6, 7, and 8 taken 5 at a time:
 - a.) have 7 and 8 in adjacent positions
 - b.) have 7 and 8 separated by exactly 1 number





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1.
 - a) There are 8 possible choices.
 - b) There are 15 possible choices.
2. There are 500 numbers between 1 000 and 9 999 that contain only even digits.
3. There are 456 976 000 different license plates possible.
4. There are 729 three digit numbers in which no adjacent digits are the same?
5. Six people can seat themselves in a room with 9 chairs, with at most 1 person in a chair, in 60 480 ways.
6.
 - a) There are 360 permutations of the numbers 1 to 6 that begin with an even number.
 - b) There are 216 permutations of the numbers 1 to 6 that begin with an odd number and end with an even number.
 - c) There are 144 permutations of the numbers 1 to 6 that begin and end with an odd number.
7.
 - a) There are 960 permutations of the numbers 1, 2, 3, 4, 5, 6, 7, and 8, taken five at a time, that have 7 and 8 in adjacent positions.
 - b) There are 720 permutations of the numbers 1, 2, 3, 4, 5, 6, 7, and 8, taken five at a time, that have 7 and 8 separated by exactly one number.

