MATH 250 **Name:**
Homework 9, Spring 2023

> "Study without desire spoils the memory, and it retains nothing that it takes in."
> LEONARDO DA VINCI

I have neither given nor received unauthorized assistance on this assignment.

Homework 9 has questions 1 through 3 with a total of 12 points. For this assignment, use Overleaf to typeset your work and upload a pdf to Canvas. This assignment is due Saturday 15 April at 11:59 PM.

1. A four digit integer has the form $d_1 d_2 d_3 d_4$, where $d_1, d_2 \ldots, d_4 \in \{0,1,2,3,4,5,6,7,8,9\}$ and $d_1 \neq 0$. Thus 1225 and 9876 are four digit numbers, but 0123 isn't a four digit number (it is a three digit number).

   In each of the following cases, determine the number of four digit integers that satisfy the given condition. **Clearly explain your work with a few sentences.**

[2] (a) No additional restrictions on the digits.

Solution:

[2] (b) Every digit is even.

Solution:

[2] (c) There are no repeated digits. Thus, 1078 is admissible, but 1040 is not admissible.

Solution:

[2] (d) No two consecutive digits are equal. Thus, 1313 is admissible, but 1331 is not admissible.

Solution:

[2] 2. From a litter of six border collies named Chomp, Fling, Zing, Zelda, Buddy, and Larry, I'm going to adopt three of them. How many distinct sets of three puppies can I adopt? **Clearly explain your work with a few sentences.**

Solution:

2 3. The prime factorization of 22087060491273622505631109 9 is $19^3 \times 37^4 \times 107^8$. Consequently, every divisor of 22087060491273622505631109 9 has the form $19^\ell \times 37^m \times 107^n$, where $\ell \in \{0,1,2,3\}$, $m \in \{0,1,2,3,4\}$, and $n \in \{0,1,2,3,4,5,6,7,8\}$. How many divisors of 22087060491273622505631109 9 are there? **Clearly explain your work with a few sentences.**

Solution: