CSC 225: Assignment 1
Discrete Mathematics

Due date:

The submission deadline is 11:59pm on Friday, September 12th, 2025.

How to hand it in:

Submit an **image** or **.pdf** of each question to the Assignment 1 Crowdmark page.

Exercises:

1. Given the word INTRODUCTION

   a. How many arrangements of the letters are there?

   b. How many arrangements are there with all T's adjacent to one another?

   c. How many arrangements are there with none of the T's adjacent to one another?

   d. How many arrangements are there with all of the vowels adjacent to one another?

2. Suppose you draw 5 cards from a standard deck of 52.

   a. How many ways can you draw exactly 3 diamonds?

   b. How many ways can you draw at least 2 diamonds?

   c. How many ways can you draw 3 spades and 2 diamonds?

3. Determine the coefficient of x^8y^6 in the following expansions:

a. $(x+y)^{14}$

b. $(-4x+2y)^{14}$

c. $(9x-5y)^{14}$

4. Determine the number of integer solutions of $x_1 + x_2 + x_3 + x_4 + x_5 = 21$, where

a. $x_i \geq 0,\ \ 1 \leq i \leq 5$

b. $x_1, x_2, x_3 \geq 1,\ \ x_4, x_5 \geq 4$

c. $x_i \geq -1,\ \ 1 \leq i \leq 5$

d. $x_i \geq 1,\ \ 1 \leq i \leq 4,\ \ 5 \leq x_5 \leq 7$

5. Use the pigeonhole principle to solve the following problems. To get full marks, you must state what the pigeons are, and what the pigeonholes are.

   a. Prove that among any 13 people, two share a birth month.

   b. To begin the Fall term, Ali decides to go for a run around the UVic Alumni Chip Trail at least one lap a day for the first 12 weeks of term (before it gets too cold out). To not overdo it, Ali makes sure to not run more than 100 laps during this 12-week time period. Show there must be a period of consecutive days for which Ali runs exactly 50 laps.