

# CSc 225 Assignment 1: Discrete Mathematics Unit

## *Due date:*

The submission deadline is 11:55pm on Monday, May 18<sup>th</sup>, 2020.

## *How to hand it in:*

Submit your assignment.pdf file through the Assignment 1 link on the CSC225 conneX page.

**IMPORTANT:** the file submitted **must** have a **.pdf** extension.

## *Exercises:*

1. Given the word UNDERGRADUATE
  - a. How many arrangements of the letters are there?
  - b. How many arrangements are there with all A's adjacent to one another?
  - c. How many arrangements are there with none of the A'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 clubs?

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

c. How many ways can you draw 3 clubs and 2 hearts?

3. Determine the coefficient of  $x^7y^5$  in the following expansions:

a.  $(x + y)^{12}$

b.  $(-4x + 3y)^{12}$

c.  $(12x - 2y)^{12}$

4. Determine the number of integer solutions of  $x_1 + x_2 + x_3 + x_4 = 16$ , where

a.  $x_i \geq 0, 1 \leq i \leq 4$

b.  $x_1, x_2 \geq 1, x_3, x_4 \geq 3$

c.  $x_i \geq -1, 1 \leq i \leq 4$

d.  $x_i \geq 1, 1 \leq i \leq 3, 5 \leq x_4 \leq 7$

5. As a New Year's Resolution, Ali decides to go for a run at least once a day for the first 5 weeks of the year. To not overdo it, Ali makes sure to not run more than 50 times during this 5-week time period. Show that there must be a period of consecutive days for which Ali goes on exactly 19 runs.