

CISC-102 FALL 2019

HOMEWORK 8

Please work on these problems and have them completed by next week. Assignments will **not** be collected for grading.

READINGS

Read sections 5.1, 5.2, 5.3, 5.4, 5.5, and 5.6 of *Schaum's Outline of Discrete Mathematics*.
Read section 3.1, 3.2, 3.4, and 3.5 of *Discrete Mathematics Elementary and Beyond*.

PROBLEMS

- (1) How many ways are there to select a 5 card poker hand from a standard deck of 52 cards, such that none of the cards are clubs?
- (2) How many ways are there to select a 5 card poker hand from a standard deck of 52 cards, such that at least one of the cards are clubs?
- (3) A skip straight is 5 cards that are in consecutive order, skipping every second rank (for example 3-5-7-9-J). How many 5 card hands are there (unordered selection from a standard 52 card deck) that form a skip straight?
- (4) You are planning a dinner party and want to choose 5 people to attend from a list of 11 close personal friends.
 - (a) In how many ways can you select the 5 people to invite.
 - (b) Suppose two of your friends are a couple and will not attend unless the other is invited. How many different ways can you invite 5 people under these constraints?
 - (c) Suppose two of your friends are enemies, and will not attend unless the other is not invited. How many different ways can you invite 5 people under these constraints?
- (5) What is the number of ways to colour n different objects, one colour per object with 2 colours? What is the number of ways to colour n different objects with 2 colours, so that each colour is used at least once.
- (6) What is the number of ways to colour n identical objects, one colour per object with 3 colours? What is the number of ways to colour n identical objects with 3 colours so that each colour is used at least once?
- (7) Consider the equation

$$x_1 + x_2 + x_3 + x_4 = 7$$

A non-negative integer solution to this equation assigns non-negative integers (integers $x, x \geq 0$) to the variables x_1, x_2, x_3, x_4 so that the sum is 7. For example one possible solution is $x_1 = 1, x_2 = 3, x_3 = 1, x_4 = 2$. And another distinct solution is $x_1 = 2, x_2 = 3, x_3 = 1, x_4 = 1$. How many distinct non-negative integer solutions are there to this equation?

- (8) From 100 used cars sitting on a lot, 20 are to be selected for a test designed to check safety requirements. These 20 cars will be returned to the lot, and again 20 will be selected for testing for emission standards
- (a) In how many ways can the cars be selected for safety requirement testing?
 - (b) In how many ways can the cars be selected for emission standards testing?
 - (c) In how many different ways can the cars be selected for both tests?
 - (d) In how many ways can the cars be selected for both tests if exactly 5 cars must be tested for safety and emission?