

Name: \_\_\_\_\_

MATH 307

Spring 2023

HW 1: Due 02/15 (16)

*“Your mind will answer most questions if you learn to relax and wait  
for the answer.”*

*– William S. Burroughs*

**Problem 1.** (10pt) A website forces you to create a 7 character password using lower case letters, the digits 0–9, and the symbols , #, !, %, and &.

- (a) How many passwords are possible?
- (b) How many passwords are there consisting of only letters or only numbers?
- (c) How many passwords start and end in a vowel?

**Problem 2.** (10pt) There are 5 teams from different schools at a STEM competition. They are presenting different robots that they built as part of a summer project. The judges will rank the five teams and select a single winner.

- (a) How many different ways can the judges rank the teams?
- (b) How many different ways can the judges choose the top three teams?
- (c) How many different ways can the judges choose a winner?

**Problem 3.** (10pt) Javier is teaching the history of the American Revolution to students. He is assigning students to several different projects, which they will later present. He has a total of 8 different projects available and there are 18 students in the class.

- (a) How many different ways can he select 5 of the projects that he has for this class?
- (b) How many different ways can he choose 3 different students to be assigned to one of his chosen projects?
- (c) How many ways can he designate two group leaders for a group of 4 students assigned to work on one of the projects?

**Problem 4.** (10pt) Students in a film class are assigned to watch and write a report on 6 different films for a class. They have a large number of drama, comedy, horror, romance, mystery, and action films to choose from. They may choose any movies from the list of films that they are given. How many different ways can they select the genres for their six movies?

**Problem 5.** (10pt) A graduating class consists of 223 students—118 female students and 105 male students. They are forming a prom committee.

- (a) How many different prom committees of 6 people can be formed?
- (b) How many different prom committees of 6 people can be formed if the committee has to have a designed president and vice president with no person serving both roles.
- (c) How many different committees having an equal number of male and female members can be formed?

**Problem 6.** (10pt) Mitchell is counting the number of outfits that he can make using the 5 shirts and 5 pants that he owns. He asserts that he can make  $5 + 5 = 10$  different outfits. Is he correct? If so, explain why using the mathematical counting principles from this course. If not, explain why he is not correct and find a way of explaining this to him.