MATH 120 In-class Activity
Day 10

Question 1. Determine a **set of objects** that is counted by each of the following quantities. You are NOT being asked to evaluate these quantities!!

(a) $7 \times 6 \times 5$

(b) $\left(\!\!\binom{4}{4}\!\!\right)$

(c) $2^9 - \binom{9}{3}$

(d) a^b

Question 2. Here are some less involved counting questions.

(a) How many 7-digit phone numbers can be formed if the first digit is not 0 or 1?

(b) In how many ways can you seat 20 people into a classroom with 35 chairs?

(c) How many six-digit passwords using letters from A–Z and digits 0–9 are there if the first two characters are letters and the last two characters are digits?

(d) How many rearrangements are there of the letters in the word "counters" where the 'o' and the 'e' are next to each other?

Question 3. In Braille code, each letter is represented by six raised and flat dots arranged in a rectangle like $\vcenter{\hbox{$\because$}}$ where the thicker dots represent raised dots and the small dots represent flat dots. To make a symbol in Braille code, at least one dot must be raised. How many possible symbols are there?

Question 4.

(a) A soccer coach has 3 goalkeepers, 8 defenders, 7 midfielders, and 4 strikers available. How many teams of 11 can be chosen if positions are ignored?

(b) A soccer coach has 3 goalkeepers, 8 defenders, 7 midfielders, and 4 strikers available. How many teams of 11 can be chosen if there must be 1 goalkeeper, 4 defenders, 4 midfielders, and 2 strikers on a team?

Question 5.

(a) In how many ways can 10 people be paired together if Bill and Ted must be paired together?

(b) In how many ways can 10 people be paired together if April and June must NOT be paired together?

Question 6. How many rearrangements of the letters $\{B, A, C, A, B, A, C, A, B, A\}$ start and end with the same letter?

Question 7.

(a) How many 8-digit numbers are made up of digits from 1–8 (where repetition is allowed) are even numbers that are greater than 40000000?

(b) How many 8-digit numbers are made up of digits from 1–8 (where repetition is not allowed) are even numbers that are greater than 40000000?

Question 8. In how many ways can 4 men and 4 women be arranged in a line in such a way if two of the men stand next to each other or two of the women stand next to each other?