

# CMSC 250: Discrete Structures

Summer 2017

## Discussion Session 3

June 21, 2017

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1. Consider a set of twenty-five points, no three of which are collinear. How many straight lines do they determine? How many triangles do they determine?

2. (a) **True** or **False**? 20 crew members of the Ruby Pearl encounter 14 gold doubloons. Greedy as ever, the pirates do not want to share any single doubloon, but they are open to having the doubloons distributed amongst themselves. If the pirates are distinguishable, but the doubloons are not, there are  $\binom{33}{14}$  different ways that the doubloons can be distributed.
- (b) **True** or **False**? In the above question, if the pirates and the doubloons both are distinguishable, then the answer is  $20^{14}$ .
- (c) **True** or **False**? In the above question, if neither the pirates nor the doubloons are distinguishable, then there is only 1 way in which the doubloons can be distributed.

3. Answer each of the following questions.

- (a) One day Charlie draws an  $10 \times 10$  grid in the sand at the beach. He picks up 10 indistinguishable pebbles from the ground and wants to place them in the grid such that no two pebbles can be in the same row or column. How many ways can he do this?
- (b) Answer (a) if the pebbles are all distinguishable.
- (c) Answer (a) if there are 2 red, 3 blue, and 5 yellow pebbles. (Pebbles of the same color are indistinguishable)
- (d) How many different outcomes are possible if three identical dice are rolled?
- (e) How many different outcomes are possible if 10 identical coins are flipped?

4. How many ways can you put 7 distinguishable balls into 3 distinguishable bins, such that no bin is empty?

Use the Principle of Inclusion-Exclusion to solve the problem.

5. (a) How many anagrams of the made-up word “brook-keeperb” do not start and end in the same letter?
- (b) Determine the number of ways to distribute 10 identical apples, 1 mango, and 1 pear to 4 hungry students so that each student gets at least 1 fruit, and the mango and pear go to different students.

6. How many permutations of length 8 are there of the 9 letters of the word **addresses**?