

# MAT-CSC A67: Discrete Mathematics — Summer 2024

## Quiz 9

Due Date: Monday, July 22, 11:59 PM, on Crowdmark

- Q1.** There are 5 distinguishable bins labeled  $\{1, 2, 3, 4, 5\}$ . How many ways are there of placing 100 indistinguishable balls into the bins.
- Q2.** Suppose a license plate consists of four letters followed by three digits.
- 2.a.** How many different license plates are possible?
  - 2.b.** How many license plates could begin with A and end with 0?
  - 2.c.** How many license plates could begin with MATA?
  - 2.d.** How many license plates are possible if you cannot repeat a letter or number (all the letters and numbers are distinct)?
  - 2.e.** How many license plates could begin with AB and have no repeated letters or numbers?
- Q3.** In the following questions, by integers from 10 through 99 we mean the set of integers  $\{10, 11, \dots, 99\}$ .
- 3.a.** How many integers are there from 10 through 99?
  - 3.b.** How many odd integers are there from 10 through 99?
  - 3.c.** How many integers from 10 through 99 have distinct digits?
  - 3.d.** How many odd integers from 10 through 99 have distinct digits?
- Q4.** Answer the following questions.
- 4.a.** How many functions are there from a set with three elements to a set with four elements?
  - 4.b.** How many functions are there from a set with five elements to a set with two elements?
  - 4.c.** How many functions are there from a set with  $m$  elements to a set with  $n$  elements, where  $m$  and  $n$  are positive integers?
- Q5.** Answer the following questions.
- 5.a.** How many ways can the letters of the word ALGORITHM be arranged in a row?
  - 5.b.** How many ways can the letters of the word ALGORITHM be arranged in a row if A and L must remain together (in order) as a unit?
  - 5.c.** How many ways can the letters of the word ALGORITHM be arranged in a row if the letters GOR must remain together (in order) as a unit?
- Q6.** In this question we are considering 5 card poker hands (cards are unordered). How many hands
- 6.a.** contain 4 aces?
  - 6.b.** contain cards of exactly two suits?
  - 6.c.** contain cards of all suits?
  - 6.d.** contain two pairs?
- Q7.** Answer the following questions.
- 7.a.** How many ways can 15 students join 5 different clubs? You can assume any student will join one club.
  - 7.b.** How does this change if now we require that each club have 3 students?
- Q8.** A certain college class has 40 students. All the students in the class are known to be from 17 through 34 years of age. You want to make a bet that the class contains at least  $x$  students of the same age. How large can you make  $x$  and yet be sure to win your bet?