ASHESI

Discrete Structures and Theory (Spring 2023)
Discussion
Date: 14/04/2023

Exercise 1:
There are four major auto routes from Boston to Detroit and six from Detroit to Los Angeles. How many major auto routes are there from Boston to Los Angeles via Detroit?

Exercise 2:
a) How many different three-letter initials can people have?
b) How many different three-letter initials with none of the letters repeated can people have?

Exercise 3:
a) How many bit strings of length ten both begin and end with a 1?
b) How many bit strings of length n, where n is a positive integer, start and end with 1s?

Exercise 4:
How many strings of eight uppercase English letters are there
a) if letters can be repeated?
b) if no letter can be repeated?
c) that start with X, if letters can be repeated?
d) that start with X, if no letter can be repeated?
e) that start and end with X, if letters can be repeated?
f) that start with the letters BO (in that order), if letters can be repeated?
g) that start and end with the letters BO (in that order), if letters can be repeated?
h) that start or end with the letters BO (in that order), if letters can be repeated?

Exercise 5:
Show that in any set of six classes, each meeting regularly once a week on a particular day of the week, there must be two that meet on the same day, assuming that no classes are held on weekends.

Exercise 6:
Show that among any group of five (not necessarily consecutive) integers, there are two with the same remainder when divided by 4.

Exercise 7:
What is the minimum number of students, each of whom comes from one of the 50 states, who must be enrolled in a university to guarantee that there are at least 100 who come from the same state?