

CS 330 : Discrete Computational Structures

Spring Semester, 2019

ASSIGNMENT #10

Due Date: Thursday, April 25

Suggested Reading: Rosen Sections 6.1 - 6.3.

These are the problems that you need to turn in. Always explain your answers and show your reasoning. **Spend time giving a complete solution. You will be graded based on how well you explain your answers. Just correct answers will not be enough!**

1. [4 Pts] An ISU Computer Science shirt is sold in 9 colors, 5 sizes, striped or solid, and long sleeve or short sleeve. (a) How many different shirts are being sold? (b) What if the red and gold shirts only come in short-sleeve and solid?
2. [6 Pts] (a) How many different four-letter codes can there be? (b) What if letters cannot be repeated, and one of the letters is K? (c) What if letters can be repeated and at least one of the initials is K?
3. [4 Pts] How many integers between 10000 and 99999, inclusive, are divisible by 5 or 7?
4. [4 Pts] How many ways can 10 friends line up if Ann, Beth and Chris have to stand next to each other (a) if Ann is ahead of Beth and Beth is ahead of Chris? (b) if Ann, Beth and Chris can be in any order?
5. [8 Pts] Let A and B be sets of 9 elements and 10 elements, respectively. (a) How many different functions possible from A to B ? from B to A ? (b) How many different relations possible from A to B ? (c) How many of the functions from A to B are one-to-one? (d) How many of the functions from B to A are onto?
6. [4 Pts] In how many ways can a photographer arrange 7 people in a row from a family of 10 people, if (a) Mom and Dad are in the photo, (b) either Mom or Dad is in the photo, not both.
7. [6 Pts] A sack contains 50 movie tickets, 5 for each of 10 different movies. Five friends want to go to a movie. (a) How many tickets would you have to remove from the sack to guarantee that everyone will be able to watch the same movie? (b) How many tickets would you have to remove from the sack if everyone wants to go to 'Avengers'? (c) Which problem required the use of the Pigeonhole Principle?
8. [3 Pts] Suppose that all the students in this class of 85 are CS majors, SE majors and Math majors. Show that there are at least 30 CS majors, at least 30 SE majors or at least 27 math majors in the class.
9. [5 Pts] How many bit strings of length 7 contain (a) exactly three 1s? (b) at most three 1's? (c) at least three 1's?
10. [6 Pts] 12 women and 10 men are on the faculty. How many ways are there to pick a committee of 8 if (a) Claire and Jane will not serve together, (b) at least one woman must be chosen, (c) at least one man and one woman must be chosen. Are there multiple ways to solve these problems? Explain.