

Discrete Structures. CSCI-150. Summer 2014.

Homework 4.

Due Mon. 16, 2014.

Problem 1

In how many ways can 15 identical candy bars be distributed among five children so that the youngest gets only one or two of them?

Problem 2 (Graded)

In how many ways can 10 identical laptops be distributed among five computer stores if

- (a) there are no restriction?
- (b) each store gets at least one? (Answer: 126).
- (c) the largest store gets at least two laptops? (Answer: 495).

Problem 3 (Graded)

Problem 2 can be reformulated in terms of equations with integer solutions, e.g.:

- (a) $x_1 + x_2 + x_3 + x_4 + x_5 = 10$, where all $x_i \geq 0$.

Complete for (b) and (c)

Problem 4 (Graded)

Prove that

$$\binom{n}{k} = \binom{n}{n-k}.$$

Is this formula related to the problem of finding the number of bit strings of length n with k ones? In what way?

Problem 5 (Graded)

A computer science professor has seven different programming books on a bookshelf. Three of the books deal with C++, the other four with Java. In how many ways can the professor arrange these books on the shelf

- (a) if there are no restrictions?
- (b) if the languages should alternate?
- (c) if all the C++ books must be next to each other?
- (d) if all the C++ books must be next to each other and all the Java books must be next to each other?

Problem 6

How many bit strings of length 10 contain at least three 1s and at least three 0s? (Answer: 912).