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 $x_i > 0$.
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).