Basics of Dynamic Programming

Basic Reading Material

Please use the following basic reading material:

1. http://www.codechef.com/wiki/tutorial-dynamic-programming

Advanced reading Material

The reader with advanced background would find this material useful:

1. Introduction to Algorithms, 3/e
   Thomas H. Cormen,Charles E. Leiserson Ronald L. Rivest ,Clifford Stein.

Introduction : What will we learn here ?

We learn designing of algorithms and the following aspect of dynamic programing .

- The program should work for any N and any K, which may be defined at run-time.

The Problem Statement

Problem 1 (Compulsory - 100 marks, difficulty level: *)

There are N packets, each with one or more candies. There are K students among which the packets have to be distributed. (Assume K<N for all cases). The parameters N and K have to be provided by the user at run-time. Each student gets only <u>one</u> packet. The number of candies in various packets are $(x_1, x_2, x_3, ….x_k)$, where x_i denotes the number of candies in the ith packet.

Find the number of triplets (x_1, x_2, x_3) possible such that sum of the candies $(x_1 + x_2 + x_3)$ is even.

Optional bonus problems

These following problems are optional and represent higher levels of difficulty (proportional to the number of stars **). Bonus marks (indicated against each) will be given for attempting these.

(**/10 points) Problem O1 :

Let unfairness be defined as

$$u \quad = \quad \sum_{1 \le i < j \le k} |X_i - X_j|$$

Divide the packets of candies among the K students such that **u** is minimum

(***/10 points) Problem O2 : Divide the packets into two parts (p1 and p2) such that the difference(|p1-p2|) is minimum, where p1 and p2 are the total number of candies in part 1 and part 2 respectively.

Submission Instructions:

Please follow the submission instructions below:
1. Upload on Sakai before 17:15 hours

Material to read for next week's lab:

Next lab will be on Python.
references:
http://www.tutorialspoint.com/python/