

X Junior Balkan Olympiad in Informatics

Skopje, 2016

Day 2: Printing cost



Short description:

Let's solve the problem in the case where $N=1$ first. This is a well-known dynamic programming problem and there are many solutions and explanations online (here is one <http://www.geeksforgeeks.org/dynamic-programming-set-18-word-wrap/>). The only thing to note is that in case multiple solutions exist, we want the one that minimizes the number of lines.

The key insight to solving the problem fully is realizing that you can do dynamic programming on each problem independently and then greedily combine the problems by putting as many as possible on each page until you run out of problems.

Analysis:

First, note that no matter how you solve the problems, it's always best to stack up as many problems as you can in a single page before moving on. Otherwise, if the problem you put on the next page instead of the current will waste at least as many lines equal to its length on the current page, so we might as well put that problem on the current page, and if needed, just waste that many lines on the next page.