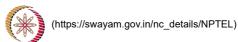
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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Design and analysis of algorithms (course)

Announcements (announcements)

About the Course (https://swayam.gov.in/nd1_noc20_cs27/preview) Ask a Question (forum)

Progress (student/home) Mentor (student/mentor)

Course outline

How does an NPTEL online course work?

Week 1 : Introduction

Week 1 : Analysis of algorithms

Week 1 Quiz

Week 2 : Searching and sorting

Week 2 Quiz

Week 2 Programming Assignment

Week 3 : Graphs

Week 6 Programming Assignment: Book Cartons

Due on 2020-03-16, 23:59 IST

- Select your language (C/C++/Java/Python2/Python3)
- Paste your code into the submission window.
- There are some public test cases and some (hidden) private test cases.
- "Compile and run" will evaluate your submission against the public test cases.
- "Submit" will evaluate your submission against the hidden private test cases. There are 10 private testcases in all, each with equal weightage. You will get feedback about which private test cases pass or fail, though you cannot see the actual test cases.
- For each private testcase, you will get a status 'Evaluated', 'Not Evaluated' or 'Time Limit Exceeded'.
 - 'Evaluated' does not mean your answer is correct, just that the entire testcase completed and reported some answer.
 - 'Time Limit Exceeded' means your code took too long.
 - 'Not Evaluated' means this testcase was not run. This typically happens to all testcases after the first one that times out.
- Ignore warnings about "Presentation errors".

Book cartons

A university department is shifting its department library to a more spacious room on a newly constructed floor. The books from the library have been packed into m cartons, numbered 1, 2, ..., m, containing $b_1, b_2, ..., b_m$ books, respectively, and transported to the new library room.

Week 3 Quiz

Week 3 **Programming Assignment**

Week 4: Weighted graphs

Week 4 Quiz

Week 4 **Programming Assignment**

Week 5: Data Structures: Union-Find and **Heaps**

Week 5: Divide and Conqure

Week 5 Quiz

Week 6: Data Structures: **Search Trees**

Week 6: Greedy **Algorithms**

Week 6 Quiz

Week 6 **Programming Assignment**

Week 6 **Programming** Assignment: **Book Cartons**

> (/noc20_cs27/progassignment? name=122)

Week 7: **Dynamic Programming**

Week 7 Quiz

I here are k student volunteers available to unpack the m cartons, where $k \le$ m. Each carton must be assigned to a single volunteer, and every volunteer must get a non-empty continuous sequence of cartons to unpack.

More formally, we need to find numbers $0 = c_0 < c_1 < c_2 < ... < c_k = m$ such that volunteer j, $1 \le j \le k$ unpacks cartons $c_{i-1}+1$ to c_i .

The time each volunteer takes to unpack a carton is directly proportional to the number of books in the carton. The goal is parallelize the unpacking to finish in the fastest possible time. For this, we need to assign cartons such that the maximum number of books assigned to any one volunteer is minimized.

Solution hint

Given a target T, use a greedy strategy to check if there is a legal allocation where no volunteer is assigned more than T books. Find the optimum T using binary search. Note that if a greedy strategy finds an allocation achieving target T using k' < k volunteers, this allocation can always be subdivided to achieve the same target with exactly *k* volunteers.

Input format

Each test case consists of exactly two lines. The first line has are two integers *m* and *k*. The second line has *m* integers $b_1, b_2, ..., b_m$ separated by spaces.

Output format

Your output should be a single line with the input sequence $b_1, b_2, ..., b_m$ divided into exactly *k* parts such that the maximum sum in a single part is as small as possible. Use the slash character ('/') to separate the parts. There must be exactly one space character between any two successive numbers and between the number and the slash. If there is more than one solution, print the one that minimizes the work assigned to the first volunteer, then to the second volunteer etc. Each volunteer must be assigned at least one carton.

Test Data:

You may assume that $1 \le k \le m \le 500$, always. Also, each carton contains a positive number of books, which is less than 10,000,000.

Sample Input 1:

93

100 200 300 400 500 600 700 800 900

Sample Output 1:

100 200 300 400 500 / 600 700 / 800 900

Week 7 Programming Assignment

Week 8: Linear Programming and Network Flows

Week 8: Intractability

Week 8 Quiz

Text Transcripts

Books

Download Videos

Sample Input 2:

5 4 100 100 100 100 100

Sample Output 2:

100 / 100 / 100 / 100 100

300 200 1

00

Private Test cases Input **Expected Output Actual Output Status** used for evaluation 17 4 100 200 3 Wr 00 400 50 100 200 300 40 100 200 300 400 on 0 600 700 0 500 / 600 700 500 600 / 700 8 **Test Case** 800 / 900 800 7 00 900 / 800 70 800 900 8 1 An 00 700 60 00 / 600 500 40 0 600 / 500 400 SW 0 500 400 0 300 200 100\n 300 200 100

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