

Problem 197: Bankrupt on Fuel

Difficulty: Medium

Author: Wojciech Koziół, Mielec, Poland

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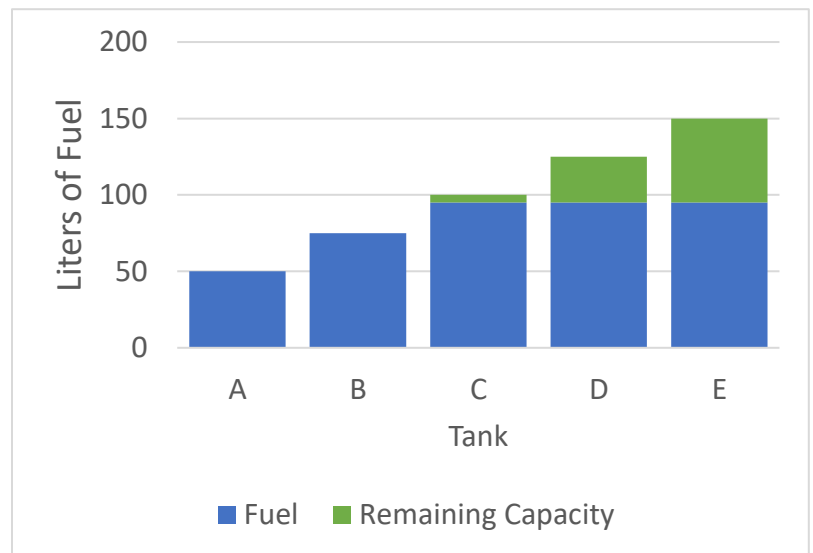
Problem Background

A bankruptcy or claims problem is a type of problem in which you need to fairly distribute some sort of finite, divisible resource amongst a number of recipients that each have a differing claim on that resource. The name comes from the similarities to financial bankruptcy; if someone doesn't have enough money to pay all of their debts, they are bankrupt. They must work with the legal system to determine a way to pay each of their creditors what they are owed. This sort of problem also occurs in computer operating systems. Each program running on a computer requires a certain amount of memory to be able to operate, but the computer only has a limited amount. The operating system is responsible for determining which programs get access to memory, and how much.

There are many ways to determine which of the claimants gets access to resources, and in what amounts; one of these methods, the "constrained equal awards rule," closely mirrors how a liquid fills a series of open containers.

Problem Description

Lockheed Martin Space is working on building a new rocket launch facility for launching government satellites. This facility will contain a number of launch pads designed for different types of rockets. Each launch pad will have its own tank to hold rocket fuel; since the rockets launched at different pads will be different sizes, these tanks have different sizes as well. All of the tanks are connected to a central refueling system, which equally



distributes fuel between all of the launch pads. Once a tank is filled, it stops receiving fuel, but all other unfilled tanks will continue to receive fuel. When the fuel supply is cut off, any unfilled tanks should have the same amount of fuel. The graph above shows an example, where five tanks with capacities of 50, 75, 100, 125, and 150 liters were filled with 410 liters of fuel; the smaller tanks are full, and the larger ones each hold 95 liters.

Unfortunately, these tanks are very large, and with recent supply chain issues, the facility supervisor is uncertain that it will be possible to obtain enough fuel to completely fill all of the tanks. She has asked your team to design a simulation tool that can indicate the expected amount of fuel in each tank, given their capacities and an amount of fuel to be distributed amongst them. To ensure that your tool is accurately reporting those amounts, she's also asked that you return the results in a fractional form, rather than rounding off decimal places.

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include the following lines of input:

- A line containing two positive integers, separated by spaces:
 - X, representing the amount of fuel available, in liters
 - N, representing the number of tanks to be filled
- A line containing N positive integers, separated by spaces. Each integer represents the capacity, in liters, of a fuel tank. The sum of all integers in this line will be greater than X.

```
3
203 3
101 50 300
199 2
100 102
410 5
50 75 100 125 150
```

Sample Output

For each test case, your program must print the amount of fuel each tank will contain when fueling is complete. List tanks in the order in which they were presented in the input and separate each value with a space. Print integers where possible; where not possible, use a simplified fractional format, including a numerator, a forward slash (/), and a denominator, such that the numerator and denominator are co-prime (their greatest common divisor is 1).

```
153/2 50 153/2
199/2 199/2
50 75 95 95 95
```