
Barcelona's trams**P38716_en**

Segon Concurs de Programació de la UPC - Final (2004-09-29)

Quite recently, the City of Barcelona has included trams to its “efficient” public transport. As expected, the result has been a nice set of accidents of outstanding originality and beauty. But diminishing aesthetic reasons, the Mayor of Barcelona has decided to reduce the delay caused by the accidents. After a thorough study the following model has been established.

Every tram must go from an initial point P_0 to a final point P_n visiting the intermediate points P_1, \dots, P_{n-1} in this order. For every $1 \leq i \leq n$, let S_i be the section that goes from P_{i-1} to P_i . Every such section must be travelled at uniform speed v_i , which is chosen by the driver at P_{i-1} . Let M_i be the maximum possible speed of the tram at S_i , and assume that the chosen speed is $0 < v_i \leq M_i$. Then the probability of crashing in S_i is v_i/M_i . When a crash happens, the tram uses an efficient recovery system that lasts only 10 seconds. Afterwards, the tram reaches P_i using an auxiliary (slow but safe) engine, which provides a speed of 5 meters per second and guarantees no more crashes in S_i .

For instance, assume that the section length is 300 meters, and that the current maximum speed is 25 meters per second. If the driver chooses to travel at 25 m/s , the tram will crash for sure. Since this can happen anywhere between P_{i-1} and P_i , for the sake of computation we can assume that it will take place exactly in the middle point (after 150 meters). Therefore, on the average the tram will spend 6 seconds to reach the middle point, 10 seconds to recover from the crash, and 30 seconds to reach P_i , for a total of 46 seconds. By contrast, if the tram starts traveling at 15 m/s , with probability 0.6 it will crash and spend 10 + 10 + 30 = 50 seconds, and with probability 0.4 it will reach P_i after 20 seconds without any crash. The average time in this case is thus just $0.6 * 50 + 0.4 * 20 = 38$ seconds.

When the tram reaches every P_i , it stops for a few seconds regardless of having crashed in S_i or not; these few seconds (for simplicity, we consider them to be 0) are enough to (almost) repair the tram: the maximum speed reduces by 1 m/s after every crash. In other words, if we call the initial maximum speed M_0 , then we have $M_i = M_0 - C_i$, where $0 \leq C_i \leq i - 1$ is the total number of crashes suffered in S_1, \dots, S_{i-1} .

Write a program to print the optimal average travel time given the initial maximum speed and the length of every section.

Input

Input consists of several cases, each one with M_0 (a real number between 5 and 1000), n (an integer number between 1 and $M_0 - 1$), and the length of every section (each one a real number between 100 and 1000).

**Output**

For every case, print the optimal average travel time with four digits after the decimal point. The input cases have no precision issues.

Sample input

```
25 1 900
25 2 900 900
25 2 305.15 980.76
5 1 1000
```

Sample output

```
102.0000
205.0303
150.0000
210.0000
```

Problem information

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