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 $P_1, \ldots, P_{n-1}$ 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 $S_1, \ldots, S_{i-1}$.

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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