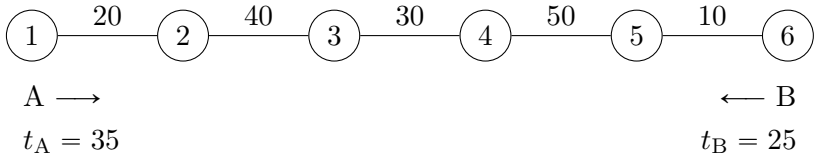
Programming 1 — Homework assignment 7

Deadline: Sunday, December 23, 2018, at 23:55

Single-track railway

Task description

On a single-track railway, a pair of trains can meet only at one of the stations — at the first one, at the last one, or at one of the intermediate stations. Train A is ready to depart from the first station to the last at time t_A, and train B is ready to depart from the last station to the first at time t_B. Suppose that there are 6 stations along the track, that the travel times between the successive stations are 20, 40, 30, 50, and 10 time units, and that $t_A = 35$ and $t_B = 25$:



If the trains meet at station 1, then train A will have to wait for 140 time units. If they meet at, say, station 4, train B will wait for 40 units. The waiting time will be shortest if they meet at station 3. In this case, train A will wait for 20 units.

After reading the number of stations (n), the travel times between the stations, the number m, and a sequence of m pairs (t_A, t_B), your program should find the minimum waiting time for each pair (t_A, t_B) and print the sum of those minimum waiting times.

Input

All input numbers are integers. The numbers in the same line are separated by a space.

The first line contains the number $n \in [2, 10^5]$. The second line contains $(n-1)$ numbers from the interval $[1, 10^3]$, which specify the travel times between the stations: the i-th number (for $i \in \{1, \ldots, n-1\}$) specifies the travel time between stations i and $i+1$). The third line contains the number m. Each of the following m lines contains the numbers $t_A \in [0, 10^8]$ and $t_B \in [0, 10^8]$.

Following are the properties of the individual test cases:

- J1–J4, S1–S20: $m \in [1, 20]$; all travel times between the successive stations are equal.
- J5–J8, S21–S40: $m \in [1, 20]$.
- J9–J10, S41–S50: $m \in [1, 10^5]$.

Output

Print the sum of the minimum waiting times for the individual pairs (t_A, t_B).

Test case J5

Input:

```
6
20 40 30 50 10
3
35 25
0 85
100 300
```

Output:

```
65
```

In the case of $t_A = 35$ and $t_B = 25$, the trains, as we have already found out, meet at station 3, with train A waiting for 20 time units. In the case of $t_A = 0$ and $t_B = 85$, the trains meet at station 5, and train B waits for 45 time units. In the case of $t_A = 100$ and $t_B = 300$, the trains don't meet at all; the waiting time is therefore equal to 0. The sum of the minimum waiting times is thus $20 + 45 + 0 = 65$.

Submission

Submit your program as a single file named `DN07_`*`vvvvvvvv`*`.java`, where *vvvvvvvv* represents your student ID number.