

Contest Duration: 2025-07-12(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250712T2100&p1=248>) - 2025-07-12(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250712T2240&p1=248>) (local time) (100 minutes)

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## G - AtCoder Express 4

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Time Limit: 2.5 sec / Memory Limit: 1024 MiB

Score : 625 points

### Problem Statement

In AtCoder Kingdom, there is a railway line extending east-west, and this line has stations  $1, 2, \dots, N$ . Station  $i$  ( $1 \leq i \leq N$ ) is located at coordinate  $x_i$  ( $x_1 < x_2 < \dots < x_N$ ).

On this line, AtCoder Express company operates  $M$  types of express trains.

The  $i$ -th type of express train operates as follows:

- You can board this train at one of the stations  $l_i, l_i + 1, \dots, r_i$ .
- You can get off this train at one of the stations  $L_i, L_i + 1, \dots, R_i$ . Here, the train travels in one direction, either east or west, satisfying  $r_i < L_i$  or  $R_i < l_i$ .
- The fare consists of a base fare of  $c_i$  plus an amount based on the distance from the boarding station to the destination station. Specifically, when traveling from station  $s$  ( $l_i \leq s \leq r_i$ ) to station  $t$  ( $L_i \leq t \leq R_i$ ), the fare is  $c_i + |x_s - x_t|$ .

You are currently at station 1. For each  $k$  ( $2 \leq k \leq N$ ), determine whether you can travel from station 1 to station  $k$  by transferring between express trains, and if you can travel, find the minimum total fare required for the travel.

### Constraints

- $2 \leq N \leq 10^5$
- $1 \leq M \leq 10^5$

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- $0 \leq x_1 < x_2 < \dots < x_N \leq 10^{12}$
  - $1 \leq l_i \leq r_i \leq N, 1 \leq L_i \leq R_i \leq N$
  - $r_i < L_i$  or  $R_i < l_i$ .
  - $1 \leq c_i \leq 10^{12}$
  - All input values are integers.
- 

## Input

The input is given from Standard Input in the following format:

```
N M
x1 x2 ... xN
l1 r1 L1 R1 c1
l2 r2 L2 R2 c2
:
lM rM LM RM cM
```

## Output

Output the answer in the following format:

```
ans2 ans3 ... ansN
```

$\text{ans}_i$  is the answer for  $k = i$ . If you can travel from station 1 to station  $i$ ,  $\text{ans}_i$  is the minimum total fare required for the travel; otherwise,  $\text{ans}_i$  is -1.

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## Sample Input 1

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```
6 3
0 20 50 90 110 150
1 2 5 6 100
1 1 2 3 10000
6 6 1 2 30
```

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## Sample Output 1

[Copy](#)

```
410 10050 -1 210 250
```

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You can travel to station 2 as follows:

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1. Board the 1st express train at station 1 and get off at station 6. The fare is  $c_1 + |x_1 - x_6| = 100 + |0 - 150| = 250$ .
2. Board the 3rd express train at station 6 and get off at station 2. The fare is  $c_3 + |x_6 - x_2| = 30 + |150 - 20| = 160$ .

The total fare in this case is 410, which is the minimum.

You cannot travel to station 4.

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## Sample Input 2

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```
10 5
4427 6839 17992 39701 46954 76602 81804 91814 95651 95895
3 4 10 10 60978
1 1 4 4 30037
9 10 7 8 66643
4 4 1 2 50872
8 10 3 7 23949
```

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## Sample Output 2

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```
149045 284335 65311 255373 225725 220523 253207 -1 182483
```

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'#telegram)

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