

Contest Duration: 2025-09-07(Sun) 14:10 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250907T1310&p1=248>) - 2025-09-07(Sun) 15:50 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250907T1450&p1=248>) (local time) (100 minutes)

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F - Eat and Ride

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 500 points

Problem Statement

There is a connected undirected graph with N vertices and M edges. The vertices are numbered vertex 1, vertex 2, ..., vertex N , and the i -th edge ($1 \leq i \leq M$) connects vertices u_i and v_i .

For $i = 1, 2, \dots, N$, solve the following problem:

Initially, Takahashi's weight is 0.

He travels by car to visit vertex 1 and moves toward vertex i . When he visits vertex v ($1 \leq v \leq N$), his weight increases by W_v .

The car he is riding can move along the edges. When he passes through an edge, letting X be his weight at that time, the car consumes X fuel.

Find the minimum amount of fuel consumed for him to reach vertex i .

Constraints

- $1 \leq N \leq 5000$
- $1 \leq M \leq 5000$
- $1 \leq W_i \leq 10^9$ ($1 \leq i \leq N$)
- $1 \leq u_i \leq v_i \leq N$ ($1 \leq i \leq M$)
- The given graph is connected.

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- All input values are integers.
-

Input

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

```
N M
W1 W2 ... WN
u1 v1
u2 v2
:
uM vM
```

Output

Output over N lines. On the i -th line ($1 \leq i \leq N$), output the amount of fuel needed for Takahashi to reach vertex i .

Sample Input 1

[Copy](#)

```
5 6
3 1 4 1 5
1 2
1 3
2 3
2 4
3 5
4 5
```

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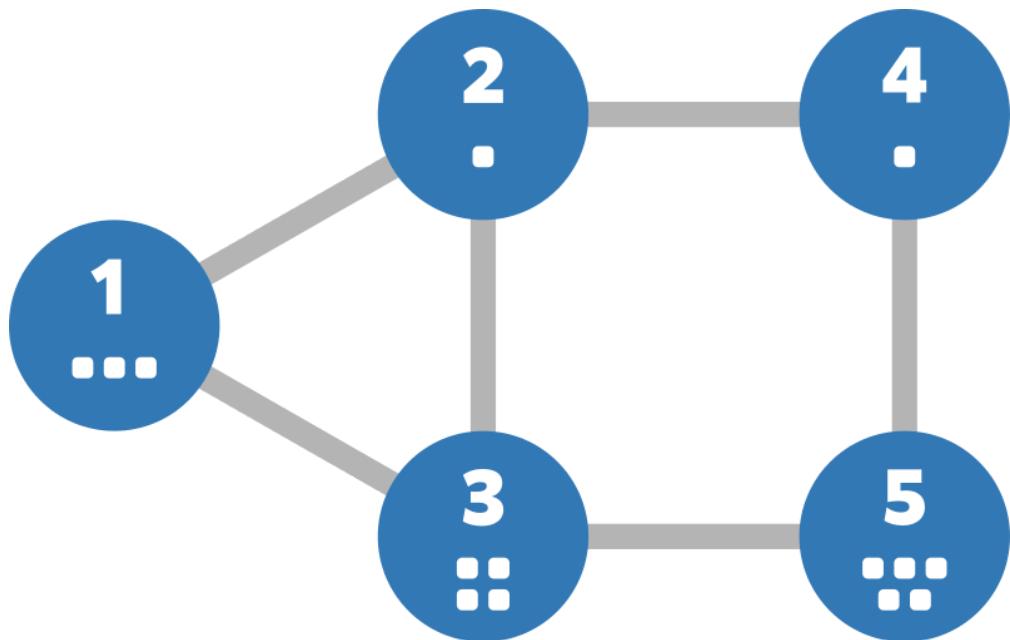
Sample Output 1

[Copy](#)

```
0
3
3
7
10
```

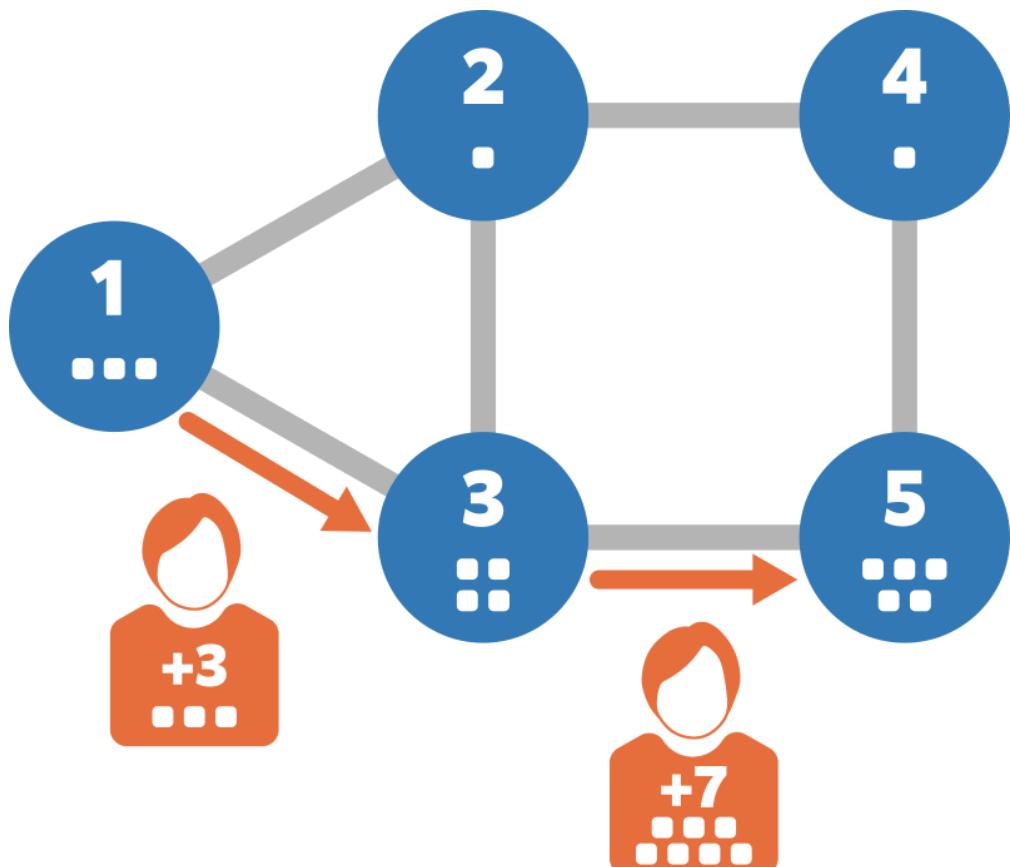
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The given graph is as follows:



For example, Takahashi can reach vertex 5 by visiting vertex 1 and then acting as follows:

- He visits vertex 1. His weight increases by 3, becoming 3.
- He consumes 3 fuel to move to vertex 3. His weight increases by 4, becoming 7.
- He consumes 7 fuel to move to vertex 5. His weight increases by 5, becoming 12.



By acting this way, he can reach vertex 5 by consuming 10 fuel. It is impossible to reduce the fuel consumption to 9 or less, so output 10 on the 5th line.

Sample Input 2

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```
5 4
```

```
1000000000 1000000000 1000000000 1000000000 1000000000
```

```
1 2
```

```
2 3
```

```
3 4
```

```
4 5
```

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Sample Output 2

Copy

```
0
```

```
1000000000
```

```
3000000000
```

```
6000000000
```

```
10000000000
```

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Note that the answer may exceed 2^{32} .

Sample Input 3

Copy

```
10 20
```

```
74931 58277 33783 91022 53003 11085 65924 63548 78622 77307
```

```
1 8
```

```
3 6
```

```
5 10
```

```
4 6
```

```
1 3
```

```
1 7
```

```
2 6
```

```
7 10
```

```
8 9
```

```
3 4
```

```
4 4
```

```
4 6
```

```
6 6
```

```
5 10
```

```
1 7
```

```
4 5
```

```
1 2
```

```
3 7
```

```
2 3
```

```
5 8
```

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Sample Output 3

CopyCopy

0
74931
74931
183645
213410
183645
74931
74931
213410
215786

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