

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,  $\dots$ , 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:

```
 $N$   $M$   
 $W_1$   $W_2$   $\dots$   $W_N$   
 $u_1$   $v_1$   
 $u_2$   $v_2$   
 $\vdots$   
 $u_M$   $v_M$ 
```

## 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

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

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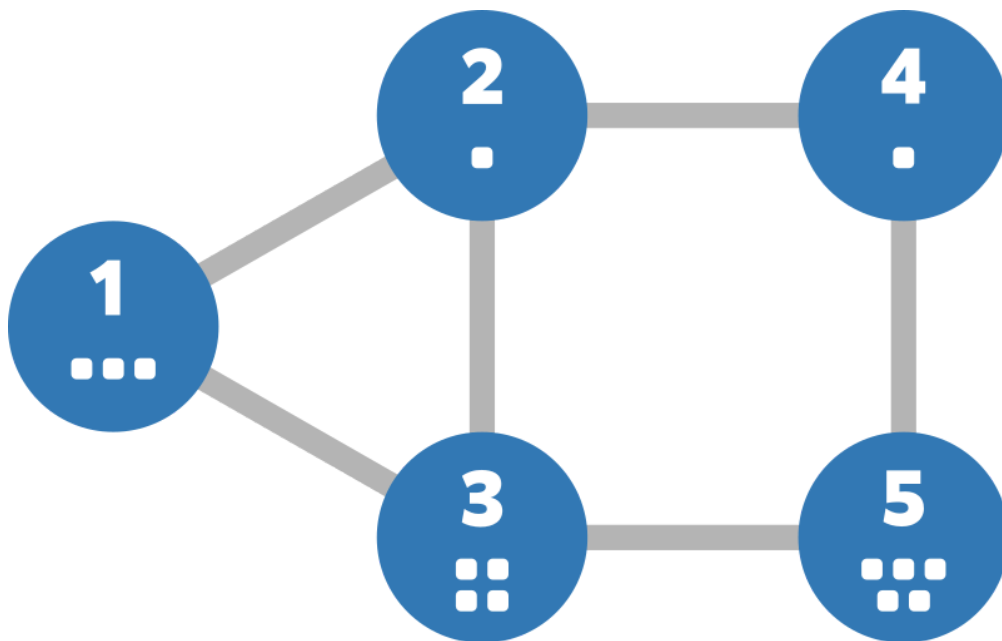
### Sample Output 1

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```
0  
3  
3  
7  
10
```

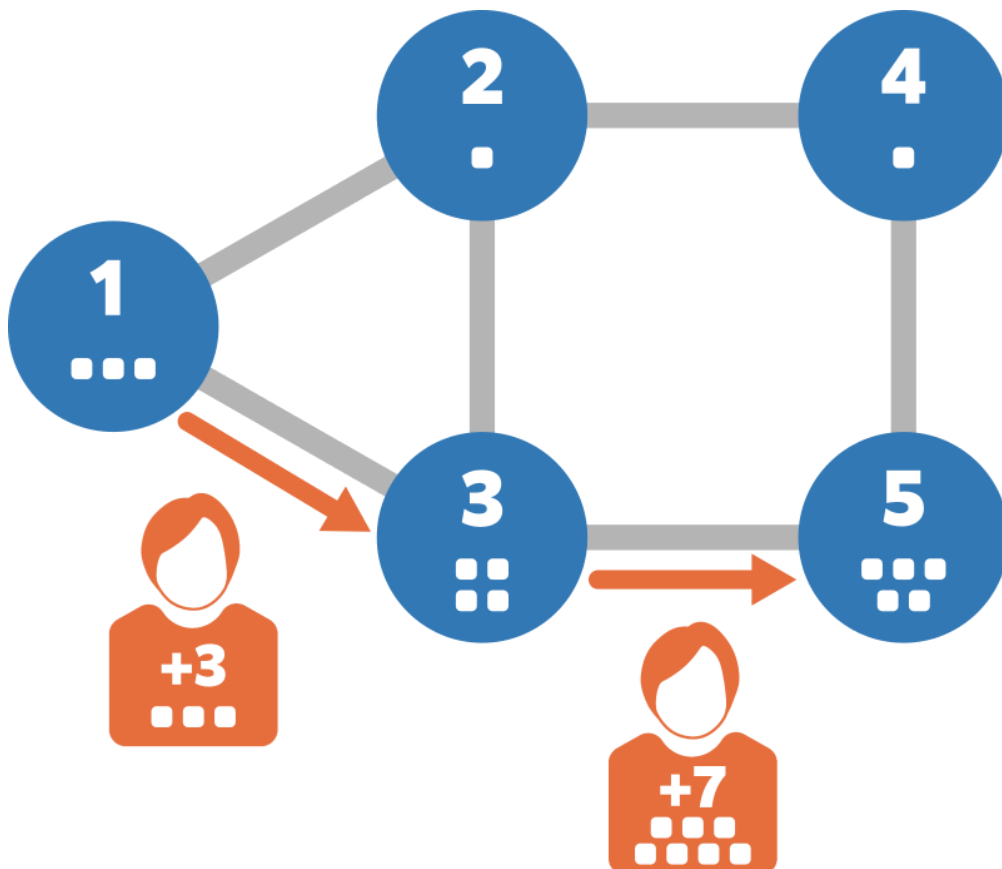
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The given graph is as follows:



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.

```
5 4
1000000000 1000000000 1000000000 1000000000 1000000000
1 2
2 3
3 4
4 5
```

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## Sample Output 2

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```
0
1000000000
3000000000
6000000000
10000000000
```

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

## Sample Input 3

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```
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

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```
0
74931
74931
183645
213410
183645
74931
74931
213410
215786
```

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