

A - Serval vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

Serval is fighting with a monster.

The *health* of the monster is H .

In one attack, Serval can decrease the monster's health by A . There is no other way to decrease the monster's health.

Serval wins when the monster's health becomes 0 or below.

Find the number of attacks Serval needs to make before winning.

Constraints

- $1 \leq H \leq 10^4$
- $1 \leq A \leq 10^4$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$H \ A$

Output

Print the number of attacks Serval needs to make before winning.

Sample Input 1

10 4

Sample Output 1

```
3
```

- After one attack, the monster's health will be 6.
- After two attacks, the monster's health will be 2.
- After three attacks, the monster's health will be -2 .

Thus, Serval needs to make three attacks to win.

Sample Input 2

```
1 10000
```

Sample Output 2

```
1
```

Sample Input 3

```
10000 1
```

Sample Output 3

```
10000
```

B - Common Raccoon vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 200 points

Problem Statement

Raccoon is fighting with a monster.

The *health* of the monster is H .

Raccoon can use N kinds of special moves. Using the i -th move decreases the monster's health by A_i .

There is no other way to decrease the monster's health.

Raccoon wins when the monster's health becomes 0 or below.

If Raccoon can win without using the same move twice or more, print 'Yes'; otherwise, print 'No'.

Constraints

- $1 \leq H \leq 10^9$
- $1 \leq N \leq 10^5$
- $1 \leq A_i \leq 10^4$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

```
H N
A_1 A_2 ... A_N
```

Output

If Raccoon can win without using the same move twice or more, print 'Yes'; otherwise, print 'No'.

Sample Input 1

```
10 3
4 5 6
```

Sample Output 1

```
Yes
```

The monster's health will become 0 or below after, for example, using the second and third moves.

Sample Input 2

```
20 3
4 5 6
```

Sample Output 2

```
No
```

Sample Input 3

```
210 5
31 41 59 26 53
```

Sample Output 3

```
Yes
```

Sample Input 4

```
211 5
31 41 59 26 53
```

Sample Output 4

```
No
```

C - Fennec vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 300 points

Problem Statement

Fennec is fighting with N monsters.

The *health* of the i -th monster is H_i .

Fennec can do the following two actions:

- Attack: Fennec chooses one monster. That monster's health will decrease by 1.
- Special Move: Fennec chooses one monster. That monster's health will become 0.

There is no way other than Attack and Special Move to decrease the monsters' health.

Fennec wins when all the monsters' healths become 0 or below.

Find the minimum number of times Fennec needs to do Attack (not counting Special Move) before winning when she can use Special Move at most K times.

Constraints

- $1 \leq N \leq 2 \times 10^5$
- $0 \leq K \leq 2 \times 10^5$
- $1 \leq H_i \leq 10^9$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

```
 $N$   $K$   
 $H_1$  ...  $H_N$ 
```

Output

Print the minimum number of times Fennec needs to do Attack (not counting Special Move) before winning.

Sample Input 1

```
3 1
4 1 5
```

Sample Output 1

```
5
```

By using Special Move on the third monster, and doing Attack four times on the first monster and once on the second monster, Fennec can win with five Attacks.

Sample Input 2

```
8 9
7 9 3 2 3 8 4 6
```

Sample Output 2

```
0
```

She can use Special Move on all the monsters.

Sample Input 3

```
3 0
1000000000 1000000000 1000000000
```

Sample Output 3

```
3000000000
```

Watch out for overflow.

D - Caracal vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 400 points

Problem Statement

Caracal is fighting with a monster.

The *health* of the monster is H .

Caracal can attack by choosing one monster. When a monster is attacked, depending on that monster's health, the following happens:

- If the monster's health is 1, it drops to 0.
- If the monster's health, X , is greater than 1, that monster disappears. Then, two new monsters appear, each with the health of $\lfloor X/2 \rfloor$.

($\lfloor r \rfloor$ denotes the greatest integer not exceeding r .)

Caracal wins when the healths of all existing monsters become 0 or below.

Find the minimum number of attacks Caracal needs to make before winning.

Constraints

- $1 \leq H \leq 10^{12}$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

H

Output

Find the minimum number of attacks Caracal needs to make before winning.

Sample Input 1

2

Sample Output 1

3

When Caracal attacks the initial monster, it disappears, and two monsters appear, each with the health of 1.

Then, Caracal can attack each of these new monsters once and win with a total of three attacks.

Sample Input 2

4

Sample Output 2

7

Sample Input 3

10000000000000

Sample Output 3

1099511627775

E - Crested Ibis vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

Ibis is fighting with a monster.

The *health* of the monster is H .

Ibis can cast N kinds of spells. Casting the i -th spell decreases the monster's health by A_i , at the cost of B_i Magic Points.

The same spell can be cast multiple times. There is no way other than spells to decrease the monster's health.

Ibis wins when the health of the monster becomes 0 or below.

Find the minimum total Magic Points that have to be consumed before winning.

Constraints

- $1 \leq H \leq 10^4$
- $1 \leq N \leq 10^3$
- $1 \leq A_i \leq 10^4$
- $1 \leq B_i \leq 10^4$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

```
H  N
A1 B1
:
AN BN
```

Output

Print the minimum total Magic Points that have to be consumed before winning.

Sample Input 1

```
9 3
8 3
4 2
2 1
```

Sample Output 1

```
4
```

First, let us cast the first spell to decrease the monster's health by 8, at the cost of 3 Magic Points. The monster's health is now 1.

Then, cast the third spell to decrease the monster's health by 2, at the cost of 1 Magic Point. The monster's health is now -1 .

In this way, we can win at the total cost of 4 Magic Points.

Sample Input 2

```
100 6
1 1
2 3
3 9
4 27
5 81
6 243
```

Sample Output 2

```
100
```

It is optimal to cast the first spell 100 times.

Sample Input 3

```
9999 10
540 7550
691 9680
700 9790
510 7150
415 5818
551 7712
587 8227
619 8671
588 8228
176 2461
```

Sample Output 3

```
139815
```

F - Silver Fox vs Monster

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

Silver Fox is fighting with N monsters.

The monsters are standing in a row, and we can assume them to be standing on a number line. The i -th monster, standing at the coordinate X_i , has the *health* of H_i .

Silver Fox can use bombs to attack the monsters. Using a bomb at the coordinate x decreases the healths of all monsters between the coordinates $x - D$ and $x + D$ (inclusive) by A . There is no way other than bombs to decrease the monster's health.

Silver Fox wins when all the monsters' healths become 0 or below.

Find the minimum number of bombs needed to win.

Constraints

- $1 \leq N \leq 2 \times 10^5$
- $0 \leq D \leq 10^9$
- $1 \leq A \leq 10^9$
- $0 \leq X_i \leq 10^9$
- $1 \leq H_i \leq 10^9$
- X_i are distinct.
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

```
 $N$   $D$   $A$   
 $X_1$   $H_1$   
:  
 $X_N$   $H_N$ 
```

Output

Print the minimum number of bombs needed to win.

Sample Input 1

```
3 3 2
1 2
5 4
9 2
```

Sample Output 1

```
2
```

First, let us use a bomb at the coordinate 4 to decrease the first and second monsters' health by 2.

Then, use a bomb at the coordinate 6 to decrease the second and third monsters' health by 2.

Now, all the monsters' healths are 0. We cannot make all the monsters' health drop to 0 or below with just one bomb.

Sample Input 2

```
9 4 1
1 5
2 4
3 3
4 2
5 1
6 2
7 3
8 4
9 5
```

Sample Output 2

```
5
```

We should use five bombs at the coordinate 5.

Sample Input 3

```
3 0 1
300000000 1000000000
100000000 1000000000
200000000 1000000000
```

Sample Output 3

```
3000000000
```

Watch out for overflow.