A. Voidwalker

Description

Once there was a voidwalker in the VOID who was eager for power.

The VOID consists of N spots and M one-way tunnels. The voidwalker can walk through tunnel i by spending w_i energy (a positive w_i means lossing w_i energy, a negative w_i means gaining $|w_i|$ energy, while $w_i = 0$ means no effect).

The characteristic of energy differs in different spots. In spot i, the voidwalker can compose an energy core using a_i energy, or decompose an energy core into a_i energy. The voidwalker can carry at most one energy core with him while walking through a tunnel, since there will be a disaster otherwise.

The voidwalker begins its journey at spot S with initial power 0. It wonders the maximum energy it can reach with no more than $2K$ operations (an operation is either a compose or a decompose). It is valid for the energy to fall to negative.

If the voidwalker can gain infinite energy, output **`INVINCIBLE`**.

Input format

The first line contains four integers N, M, K, S.

The second line contains N integers $a_1, a_2, \ldots, a_N$.

For the next M lines, the i^{th} line contains x_i, y_i, w_i, representing a one-way tunnel from spot x_i to spot y_i which costs w_i energy.

Output format

Output the maximum energy, or **`INVINCIBLE`**.

Samples

Sample 1 Input

```
4 15 3 1
14 26 26 15
2 1 7
1 2 3
4 2 10
2 4 2
3 1 4
1 3 9
4 2 2
2 3 8
4 4 8
3 4 9
1 3 10
1 2 6
4 4 2
4 2 3
2 4 10
```

Sample 1 Output

```
23
```

Sample 2 Input

```
4 15 2 1
18 2 23 17
4 1 4
1 4 5
3 1 3
4 3 10
2 1 10
4 2 3
3 2 -4
3 1 3
1 2 -5
1 3 0
4 2 4
4 2 -3
2 1 -3
4 3 -2
4 2 -3
```

Sample 2 Output

```
INVINCIBLE
```

Sample 3 Input

```
4 15 3 3
22 19 30 19
2 3 8
3 2 6
1 2 2
3 1 10
4 3 5
3 4 9
1 1 2
4 2 5
4 4 3
1 1 5
4 3 -3
4 2 1
2 2 2
3 1 -2
1 4 6
```

Sample 3 Output

```
32
```

Limitations & Hints

Subtask judgement enabled.

For 50% testcases (50 pts):

- $w_i \geq 0$

For 100% testcases (another 50 pts):

- $1 \leq N \leq 100$
- $1 \leq M \leq 5000$
- $1 \leq K \leq 5$
- $1 \leq S \leq N$
- $1 \leq a_i \leq 10^9$
- $1 \leq x_i, y_i \leq N$
- $|w_i| \leq 10^9$

B. Scream Out Loud

Description

Lida Pu has long suffered from a compulsion to obtain symmetric things, for example, palindrome strings.

One day, Lida Pu received a secret mail, in which he saw a string template. The template contains lowercase letters, symbol '?' corresponding to an arbitrary letter and symbol '*' corresponding to a zero or more arbitrary letters.

Please tell Lida Pu the minimum length of the palindrome string which can be obtained from the given template. If he cannot get a palindrome string anyhow, just tell him to face the reality.

Note that in Lida Pu's mind, an empty string is also a palindrome string.

Input format

The input contains a string s -- the template string.

Output format

If Lida Pu can obtain a palindrome string, output the minimum length of the string. Otherwise, output "AHHHHH" (without quotes)

Samples

Sample 1 Input

```
*ac?ba
```

Sample 1 Output

```
7
```


Samples

Sample 1 Input

```
*ac?ba
```

Sample 1 Output

```
7
```


Explanation

$abacaba$ is one possible string.

Sample 2 Input

```
ac?ba
```


Sample 2 Input

```
ac?ba
```


Sample 2 Output

```
AHHHHH
```

Limitations & Hints

For 30% of the test cases:

- $1 \leq |s| \leq 300$

For 100% of the test cases:

- $1 \leq |s| \leq 3000$