A. Easy Math

Given n integers $a_1, a_2, \ldots, a_n$, check if the sum of their square root $\sqrt{a_1} + \sqrt{a_2} + \cdots + \sqrt{a_n}$ is a integer.

Input

The input consists of multiple tests. For each test:

The first line contains 1 integer n ($1 \le n \le 10^5$). The second line contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le 10^9$).

Output

For each test, write "`Yes`" if the sum is a integer, or "`No`" otherwise.

Sample Input

```
2
1 4
2
2 3
```

Sample Output

```
Yes
No
```

B. Carries

frog has n integers $a_1, a_2, \ldots, a_n$, and she wants to add them pairwise.

Unfortunately, frog is somehow afraid of carries (进位). She defines *hardness* $h(x, y)$ for adding x and y the number of carries involved in the calculation. For example, $h(1, 9) = 1, h(1, 99) = 2$.

Find the total hardness adding n integers pairwise. In another word, find

$$\sum_{1 \le i < j \le n} h(a_i, a_j)$$

.

Input

The input consists of multiple tests. For each test:

The first line contains 1 integer n $(2 \le n \le 10^5)$. The second line contains n integers $a_1, a_2, \ldots, a_n$. $(0 \le a_i \le 10^9)$.

Output

For each test, write 1 integer which denotes the total hardness.

Sample Input

```
2
5 5
10
0 1 2 3 4 5 6 7 8 9
```

Sample Output

```
1
20
```

C. Censor

frog is now a editor to censor so-called sensitive words (敏感词).

She has a long text p. Her job is relatively simple – just to find the first occurence of sensitive word w and remove it.

frog repeats over and over again. Help her do the tedious work.

Input

The input consists of multiple tests. For each test:

The first line contains 1 string w. The second line contains 1 string p.

($1 \leq$ length of $w, p \leq 5 \cdot 10^6$, w, p consists of only lowercase letter)

Output

For each test, write 1 string which denotes the censored text.

Sample Input

```
abc
aaabcbc
b
bbb
abc
ab
```

Sample Output

```
a

ab
```

D. Vertex Cover

frog has a graph with n vertices $v(1), v(2), \ldots, v(n)$ and m edges $(v(a_1), v(b_1)), (v(a_2), v(b_2)), \ldots, (v(a_m), v(b_m))$.

She would like to color some vertices so that each edge has at least one colored vertex.

Find the minimum number of colored vertices.

Input

The input consists of multiple tests. For each test:

The first line contains 2 integers n, m $(2 \le n \le 500, 1 \le m \le \frac{n(n-1)}{2})$. Each of the following m lines contains 2 integers a_i, b_i $(1 \le a_i, b_i \le n, a_i \ne b_i, \min\{a_i, b_i\} \le 30)$

Output

For each test, write 1 integer which denotes the minimum number of colored vertices.

Sample Input

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

Sample Output

```
1
2
```

E. Rectangle

frog has a piece of paper divided into n rows and m columns. Today, she would like to draw a rectangle whose perimeter is not greater than k.

There are 8 (out of 9) ways when $n = m = 2, k = 6$

Find the number of ways of drawing.

Input

The input consists of multiple tests. For each test:

The first line contains 3 integer n, m, k ($1 \leq n, m \leq 5 \cdot 10^4, 0 \leq k \leq 10^9$).

Output

For each test, write 1 integer which denotes the number of ways of drawing.

Sample Input

```
2 2 6
1 1 0
50000 50000 1000000000
```

Sample Output

```
8
0
1562562500625000000
```

F. Necklace

frog has n gems arranged in a cycle, whose *beautifulness* are $a_1, a_2, \ldots, a_n$. She would like to remove some gems to make them into a *beautiful necklace* without changing their relative order.

Note that a *beautiful necklace* can be divided into 3 consecutive parts X, y, Z, where

1. X consists of gems with non-decreasing *beautifulness*,
2. y is **the only** *perfect gem*. (A *perfect gem* is a gem whose *beautifulness* equals to 10000)
3. Z consists of gems with non-increasing *beautifulness*.

Find out the maximum total *beautifulness* of the remaining gems.

Input

The input consists of multiple tests. For each test:

The first line contains 1 integer n ($1 \le n \le 10^5$). The second line contains n integers $a_1, a_2, \ldots, a_n$. ($0 \le a_i \le 10^4$, $1 \le$ number of perfect gems ≤ 10).

Output

For each test, write 1 integer which denotes the maximum total remaining *beautifulness*.

Sample Input

```
6
10000 3 2 4 2 3
2
10000 10000
```

Sample Output

```
10010
10000
```

G. Party

n frogs are invited to a tea party. Frogs are conveniently numbered by $1, 2, \ldots, n$.

The tea party has black and green tea in service. Each frog has its own preference. He or she may drink only black/green tea or accept both.

There are m pairs of frogs who dislike each other. They fight when they are serving the same type of tea.

Luckily, frogs can be divided into 2 groups such that no two frogs in the same group dislike each other.

Frogs like gems. If the i-th frog can be paid w_i gems instead of serving tea, it will not fight with others anymore.

The party manager has to dicide how to serve tea/pay gems to avoid fights, minimizing the total gems paid.

Input

The input consists of multiple tests. For each test:

The first line contains 2 integers n, m $(1 \le n \le 10^3, 0 \le m \le 10^4)$. The second line contains n integers $w_1, w_2, \ldots, w_n$. $(1 \le w_i \le 10^6)$.

The third line contains n integers $p_1, p_2, \ldots, p_n$. $(1 \le p_i \le 3)$. $p_i = 1$ means the i-th frog drinks only black tea. $p_i = 2$ means it drinks only green one, while $p_i = 3$ means it accepts both.

Each of the following m lines contains 2 integers a_i, b_i, which denotes frog a_i and b_i dislike each other. $(1 \le a_i, b_i \le n)$

Output

For each test, write 1 integer which denotes the minimum total gems paid.

Sample Input

```
2 1
1 1
3 3
1 2
2 1
1 1
2 2
1 2
3 2
2 1 2
1 3 2
1 2
2 3
```

Sample Output

```
0
1
1
```

H. Range Query

frog has a permutation $p(1), p(2), \ldots, p(n)$ of $\{1, 2, \ldots, n\}$. She also has $m_1 + m_2$ records (a_i, b_i, c_i) of the permutation.

- For $1 \le i \le m_1$, (a_i, b_i, c_i) means $\min\{p(a_i), p(a_i + 1), \ldots, p(b_i)\} = c_i$;
- For $m_1 < i \le m_1 + m_2$, (a_i, b_i, c_i) means $\max\{p(a_i), p(a_i + 1), \ldots, p(b_i)\} = c_i$.

Find a permutation which is consistent with above records, or report the records are self-contradictory. If there are more than one valid permutations, find the lexicographically least one.

Permutation $p(1), p(2), \ldots, p(n)$ is lexicographically smaller than $q(1), q(2), \ldots, q(n)$ if and only if there exists $1 \le i \le n$ which $p(i) < q(i)$ and for all $1 \le j < i$, $p(j) = q(j)$.

Input

The input consists of multiple tests. For each test:

The first line contains 3 integers n, m_1, m_2 $(1 \le n \le 50, 0 \le m_1 + m_2 \le 50)$. Each of the following $(m_1 + m_2)$ lines contains 3 integers a_i, b_i, c_i $(1 \le a_i \le b_i \le n, 1 \le c_i \le n)$.

Output

For each test, write n integers $p(1), p(2), \ldots, p(n)$ which denote the lexicographically least permutation, or "`-1`'' if records are self-contradictory.

Sample Input

```
5 1 1
1 5 1
1 5 5
3 1 1
1 2 2
1 2 2
```

Sample Output

```
1 2 3 4 5
-1
```

I. Travel

The country frog lives in has n towns which are conveniently numbered by $1, 2, \dots, n$.

Among $\frac{n(n-1)}{2}$ pairs of towns, m of them are connected by bidirectional highway, which needs a minutes to travel. The other pairs are connected by railway, which needs b minutes to travel.

Find the minimum time to travel from town 1 to town n.

Input

The input consists of multiple tests. For each test:

The first line contains 4 integers n, m, a, b ($2 \le n \le 10^5, 0 \le m \le 5 \cdot 10^5, 1 \le a, b \le 10^9$). Each of the following m lines contains 2 integers u_i, v_i, which denotes cities u_i and v_i are connected by highway. ($1 \le u_i, v_i \le n, u_i \ne v_i$).

Output

For each test, write 1 integer which denotes the minimum time.

Sample Input

```
3 2 1 3
1 2
2 3
3 2 2 3
1 2
2 3
```

Sample Output

```
2
3
```

J. Right turn

frog is trapped in a maze. The maze is infinitely large and divided into grids. It also consists of n obstacles, where the i-th obstacle lies in grid (x_i, y_i).

frog is initially in grid $(0, 0)$, heading grid $(1, 0)$. She moves according to *The Law of Right Turn*: she keeps moving forward, and turns right encountering a obstacle.

The maze is so large that frog has no chance to escape. Help her find out the number of turns she will make.

Input

The input consists of multiple tests. For each test:

The first line contains 1 integer n ($0 \le n \le 10^3$). Each of the following n lines contains 2 integers x_i, y_i. $(|x_i|, |y_i| \le 10^9, (x_i, y_i) \ne (0, 0)$, all (x_i, y_i) are distinct)

Output

For each test, write 1 integer which denotes the number of turns, or "`-1`'' if she makes infinite turns.

Sample Input

```
2
1 0
0 -1
1
0 1
4
1 0
0 1
0 -1
-1 0
```

Sample Output

```
2
0
-1
```