Problem A - Playlist
UAC2 2015

You and your friends are going on a road trip and you would like to prepare the music for the car. To do so, each one of you has selected a list of songs and now you will put them all together. You decided to define the fairness of the playlist as the minimum number of songs between any two songs proposed by the same person.

After long hours of work, you and your friends came up with a playlist. Your task is to evaluate its fairness.

Input

The first line contains a single integer n indicating the number of songs in the playlist. Then follow n integers separated by single spaces $s_1, \ldots, s_n$ representing the songs on the playlist. Each integer represents the id of the person who proposed the song.

Constraints

- $1 \leq n \leq 1000$
- $1 \leq s_i \leq n$
- At least one person proposed 2 songs and no one proposed 0 songs.

Output

A single line with an integer representing the fairness of the playlist.

Sample Test Cases

Sample Input 1

```
10
1 2 3 1 2 3 1 2 3 1
```

Sample Output 1

```
2
```

Sample Input 2

5
4 1 2 3 4

Sample Output 2

3

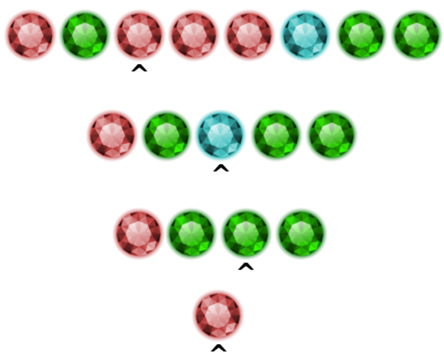
Problem B - Gems
UAC2 2015

Every day you take the train to go to the university and every day you get bored during the trip. To occupy your time you play games on your phone. Lately you have been playing a game that consists of destroying a row of coloured gems. When you click on a gem, all gems that form a continuous sequence of the same colour of the gem you clicked on, get destroyed. The goal of the game is to destroy all the gems.

Playing the game is fun but you would like to know if you are playing optimaly. Hence you decided to write an algorithm that computes the minimum number of clicks necessary to destroy a sequence of gems.

Example:

In the following configuration the minimum numbers of clicks is 4:



Input

The first line of the input contains a single integer n giving the number of gems. The second line contains n integers $c_1, \ldots, c_n$ separated by single spaces representing the colours of the gems.

Constraints

- $1 \leq n \leq 1000$
- $1 \leq c_i \leq n$

Output

A single integer representing the minimum number of clicks required to destroy all the gems.

Sample Test Cases

Sample Input 1

5
1 2 3 2 1

Sample Output 1

3

Sample Input 2

1 2 1 1 1 3 2 2

Sample Output 2

4

Problem C - Meeting on the way
UAC2 2015

You work for a pizza delivery company that puts a lot of effort to deliver pizzas as fast as possible. Therefore, when a client orders a pizza, you compute the minimum time required to reach the client and give that time as a waiting time to the client (we assume that pizzas are ready instantly). It is very bad for the image of the company if the pizzas are delivered any time later. Also, your clients only accept to be served by the same delivery person every time they order a pizza.

You realize that you mixed up the last two orders. You want to avoid having to call the clients to tell them that their pizzas are going to be delivered late. To do so you call the two persons responsible for the deliveries of the pizzas and tell them that their clients are reversed. Since each client only accepts to be served by the same delivery person every time, the only solution is for them to meet at some point, exchange pizzas and proceed with the delivey. You should assume that the pizza exchange takes no time.

Knowing their locations, your job is to determine if it is necessary to call the clients to tell them that the pizzas will be late or not.

Input

The city is represented by a graph. The vertices represent places where you can stop and the edges represent the time it take to get from one place to the other.

The first line of the input consists of two integers n and m representing the number vertices and edges of the graph, respectivelly. Then follow m lines each with three integers separated by single spaces: x_i, y_i, t_i representing that there is an edge between x_i and y_i and it takes t_i minutes to traverse it. Note that the edges can be traversed in any direction. No edge will be given more than one time in the input and the graph is connected.

The last line of the input contains four integers c_1, c_2, d_1, d_2 separated by single spaces. c_1 and c_2 represent the current locations of the delivery persons and d_1, d_2 represent the delivery locations. The person at c_1 must deliver at d_1 and the person at c_2 must deliver at d_2.

Constraints

- $1 \leq n \leq 2000$
- $n - 1 \leq m \leq n(n-1)/2$
- $0 \leq x_i < y_i < n$
- $1 \leq t_i \leq 10000$
- $0 \leq c_1, c_2, d_1, d_2 < n$
- c_1, c_2, d_1, d_2 are all distinct

Output

A single line with `yes` if it is possible that none of the pizzas will be delivered late and `no` otherwise.

Sample Test Cases

Sample Input 1

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

Sample Output 1

```
yes
```

Sample Input 2

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

4 7 1
5 7 1
1 2 6 7

Sample Output 2

no

Problem D - Stocking goods
UAC2 2015

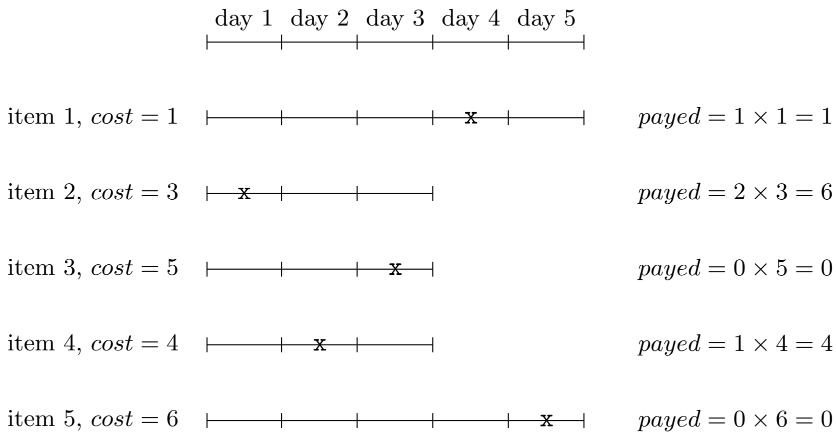
A huge factory has to plan the production of n items over n days. Each item has a deadline at which it must have been produced and a stocking cost which represents the cost of stocking that item from one day to another. Each day only one item can be produced and thus they have to decide for each of the n days, which item will be produced.

Example:

Suppose that $n = 5$ so that we have 5 days and 5 items to produce. Let the deadlines and the stocking costs of the items be as in the following table:

item id	deadline	stocking cost
1	5	1
2	3	3
3	3	5
4	3	4
5	5	6

The optimal production plan has cost 11 and is the following (the `x`'s mark the production days of the items):



$total = 1 + 6 + 0 + 4 + 0 = 11$

Knowing that you have very good problem solving skills they would like your help to know what is the minimum cost that can be achieved.

Input

The first line of the input contains a single integer n representing the number of production days and items.

Then follow n lines each with two integers d_i and c_i separated by a single space giving the deadline of item i and its cost.

Constraints

- $1 \leq n \leq 20000$
- $1 \leq c_i \leq 1000$
- $1 \leq d_i \leq n$

Output

A single line with an integer giving the minimum cost that can be achieved.

Sample Test Cases

Sample Input 1

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

Sample Output 1

```
11
```

Sample Input 2

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

Sample Output 2

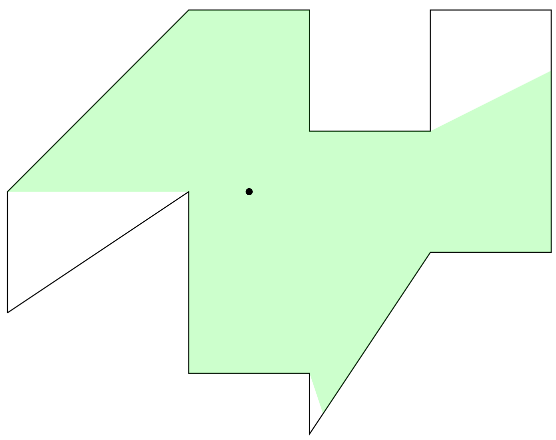
```
4
```

Problem E - Video surveillance
UAC2 2015

A polygonal store has a security camera to perform video surveillance installed on its ceiling. The camera has a 360 degree view.

Your want to know if the store is secure so you would like to know whether the camera is able to film the whole store or not.

Example:



The green area represents the area that the camera can film.

Input

The first line of the input contains a single integer n that represents the number of vertices of the polygon representing the store. Then follow n lines each with two integers x_i and y_i separated by single spaces giving the vertices of the polygon in clockwise order. The last line of the input contains two integers cx and cy separated by a single space representing the position of the camera.

Constraints

- $1 \leq n \leq 200$
- $0 \leq x_i, y_i \leq 10000$

- (cx, cy) is inside the polygon.
- The polygon has no self-intersections.

Output

A single line with `yes` if the camera can film the whole store and `no` otherwise.

Sample Test Cases

Sample Input 1

```
15
0 2
0 4
3 7
5 7
5 5
7 5
7 7
9 7
9 3
7 3
5 0
5 1
3 1
3 4
0 2
4 4
```

Sample Output 1

```
no
```

Sample Input 2

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

Sample Output 2

```
yes
```