

**Codeforces Round #444 (Div. 2)****A. Div. 64**

time limit per test: 1 second  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

Top-model Izabella participates in the competition. She wants to impress judges and show her mathematical skills.

Her problem is following: for given string, consisting of only 0 and 1, tell if it's possible to remove some digits in such a way, that remaining number is a representation of some positive integer, divisible by 64, in the binary numerical system.

**Input**

In the only line given a non-empty binary string  $s$  with length up to 100.

**Output**

Print «yes» (without quotes) if it's possible to remove digits required way and «no» otherwise.

**Examples**

|               |
|---------------|
| <b>input</b>  |
| 100010001     |
| <b>output</b> |
| yes           |

|               |
|---------------|
| <b>input</b>  |
| 100           |
| <b>output</b> |
| no            |

**Note**

In the first test case, you can get string 1 000 000 after removing two ones which is a representation of number 64 in the binary numerical system.

You can read more about binary numeral system representation here: [https://en.wikipedia.org/wiki/Binary\\_system](https://en.wikipedia.org/wiki/Binary_system)

## B. Cubes for Masha

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

Absent-minded Masha got set of  $n$  cubes for her birthday.

At each of 6 faces of each cube, there is exactly one digit from 0 to 9. Masha became interested what is the largest natural  $x$  such she can make using her new cubes all integers from 1 to  $x$ .

To make a number Masha can rotate her cubes and put them in a row. After that, she looks at upper faces of cubes from left to right and reads the number.

The number can't contain leading zeros. It's not required to use all cubes to build a number.

Pay attention: Masha can't make digit 6 from digit 9 and vice-versa using cube rotations.

### Input

In first line integer  $n$  is given ( $1 \leq n \leq 3$ ) — the number of cubes, Masha got for her birthday.

Each of next  $n$  lines contains 6 integers  $a_{ij}$  ( $0 \leq a_{ij} \leq 9$ ) — number on  $j$ -th face of  $i$ -th cube.

### Output

Print single integer — maximum number  $x$  such Masha can make any integers from 1 to  $x$  using her cubes or 0 if Masha can't make even 1.

### Examples

| input  |
|--|
| 3<br>0 1 2 3 4 5<br>6 7 8 9 0 1<br>2 3 4 5 6 7 |
| output   |
| 87   |

| input  |
|--|
| 3<br>0 1 3 5 6 8<br>1 2 4 5 7 8<br>2 3 4 6 7 9 |
| output   |
| 98   |

### Note

In the first test case, Masha can build all numbers from 1 to 87, but she can't make 88 because there are no two cubes with digit 8.

### C. Solution for Cube

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

During the breaks between competitions, top-model IZABELLA tries to develop herself and not to be bored. For example, now she tries to solve Rubik's cube 2x2x2.

It's too hard to learn to solve Rubik's cube instantly, so she learns to understand if it's possible to solve the cube in some state using 90-degrees rotation of one face of the cube in any direction.

To check her answers she wants to use a program which will for some state of cube tell if it's possible to solve it using one rotation, described above.

Cube is called solved if for each face of cube all squares on it has the same color.

[https://en.wikipedia.org/wiki/Rubik's\\_Cube](https://en.wikipedia.org/wiki/Rubik's_Cube)

#### Input

In first line given a sequence of 24 integers  $a_i$  ( $1 \leq a_i \leq 6$ ), where  $a_i$  denotes color of  $i$ -th square. There are exactly 4 occurrences of all colors in this sequence.

#### Output

Print «YES» (without quotes) if it's possible to solve cube using one rotation and «NO» (without quotes) otherwise.

#### Examples

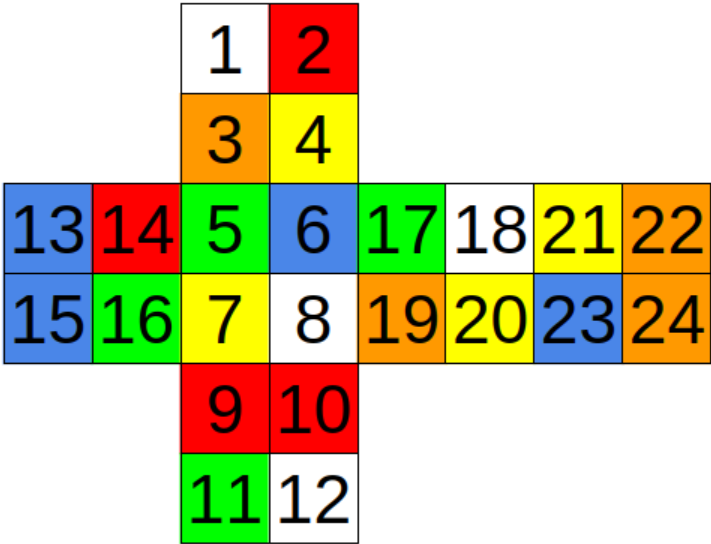
|   |
|---|
| input   |
| 2 5 4 6 1 3 6 2 5 5 1 2 3 5 3 1 1 2 4 6 6 4 3 4 |
| output  |
| NO  |

|   |
|---|
| input   |
| 5 3 5 3 2 5 2 5 6 2 6 2 4 4 4 4 1 1 1 1 6 3 6 3 |
| output  |
| YES   |

#### Note

In first test case cube looks like this:



In second test case cube looks like this:

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
|    |    | 1  | 2  |    |    |    |    |
|    |    | 3  | 4  |    |    |    |    |
| 13 | 14 | 5  | 6  | 17 | 18 | 21 | 22 |
| 15 | 16 | 7  | 8  | 19 | 20 | 23 | 24 |
|    |    | 9  | 10 |    |    |    |    |
|    |    | 11 | 12 |    |    |    |    |

It's possible to solve cube by rotating face with squares with numbers 13, 14, 15, 16.

## D. Ratings and Reality Shows

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

There are two main kinds of events in the life of top-model: fashion shows and photo shoots. Participating in any of these events affects the rating of appropriate top-model. After each photo shoot model's rating increases by  $a$  and after each fashion show decreases by  $b$  (designers do too many experiments nowadays). Moreover, sometimes top-models participates in talk shows. After participating in talk show model becomes more popular and increasing of her rating after photo shoots become  $c$  and decreasing of her rating after fashion show becomes  $d$ .

Izabella wants to participate in a talk show, but she wants to do it in such a way that her rating will never become negative. Help her to find a suitable moment for participating in the talk show.

Let's assume that model's career begins in moment 0. At that moment Izabella's rating was equal to  $start$ . If talk show happens in moment  $t$  it will affect all events in model's life in interval of time  $[t..t + len)$  (including  $t$  and not including  $t + len$ ), where  $len$  is duration of influence.

Izabella wants to participate in a talk show, but she wants to do it in such a way that her rating will not become negative before talk show or during period of influence of talk show. Help her to find a suitable moment for participating in the talk show.

### Input

In first line there are 7 positive integers  $n, a, b, c, d, start, len$  ( $1 \leq n \leq 3 \cdot 10^5$ ,  $0 \leq start \leq 10^9$ ,  $1 \leq a, b, c, d, len \leq 10^9$ ), where  $n$  is a number of fashion shows and photo shoots,  $a, b, c$  and  $d$  are rating changes described above,  $start$  is an initial rating of model and  $len$  is a duration of influence of talk show.

In next  $n$  lines descriptions of events are given. Each of those lines contains two integers  $t_i$  and  $q_i$  ( $1 \leq t_i \leq 10^9$ ,  $0 \leq q \leq 1$ ) — moment, in which event happens and type of this event. Type 0 corresponds to the fashion show and type 1 — to photo shoot.

Events are given in order of increasing  $t_i$ , all  $t_i$  are different.

### Output

Print one non-negative integer  $t$  — the moment of time in which talk show should happen to make Izabella's rating non-negative before talk show and during period of influence of talk show. If there are multiple answers print smallest of them. If there are no such moments, print  $-1$ .

### Examples

| input  |
|--|
| 5 1 1 1 4 0 5<br>1 1<br>2 1<br>3 1<br>4 0<br>5 0 |
| output   |
| 6  |
| input  |
| 1 1 2 1 2 1 2<br>1 0                             |
| output   |
| -1   |

## E. Little Brother

time limit per test: 3 seconds

memory limit per test: 512 megabytes

input: standard input

output: standard output

Masha's little brother draw two points on a sheet of paper. After that, he draws some circles and gave the sheet to his sister.

Masha has just returned from geometry lesson so she instantly noticed some interesting facts about brother's drawing.

At first, the line going through two points, that brother drew, doesn't intersect or touch any circle.

Also, no two circles intersect or touch, and there is no pair of circles such that one circle is located inside another.

Moreover, for each circle, Masha drew a square of the minimal area with sides parallel axis such that this circle is located inside the square and noticed that there is no two squares intersect or touch and there is no pair of squares such that one square is located inside other.

Now Masha wants to draw circle of minimal possible radius such that it goes through two points that brother drew and doesn't intersect any other circle, but other circles can touch Masha's circle and can be located inside it.

**It's guaranteed, that answer won't exceed  $10^{12}$ . It should be held for hacks as well.**

### Input

First line contains four integers  $x_1, y_1, x_2, y_2$  ( $-10^5 \leq x_1, y_1, x_2, y_2 \leq 10^5$ ) — coordinates of points that brother drew. First point has coordinates  $(x_1, y_1)$  and second point has coordinates  $(x_2, y_2)$ . These two points are different.

The second line contains single integer  $n$  ( $1 \leq n \leq 10^5$ ) — the number of circles that brother drew.

Next  $n$  lines contains descriptions of circles. Each line contains three integers  $x_i, y_i, r_i$  ( $-10^5 \leq x_i, y_i \leq 10^5, 1 \leq r_i \leq 10^5$ ) describing circle with center  $(x_i, y_i)$  and radius  $r_i$ .

### Output

Output smallest real number, that it's possible to draw a circle with such radius through given points in such a way that it doesn't intersect other circles.

The output is considered correct if it has a relative or absolute error of at most  $10^{-4}$ .

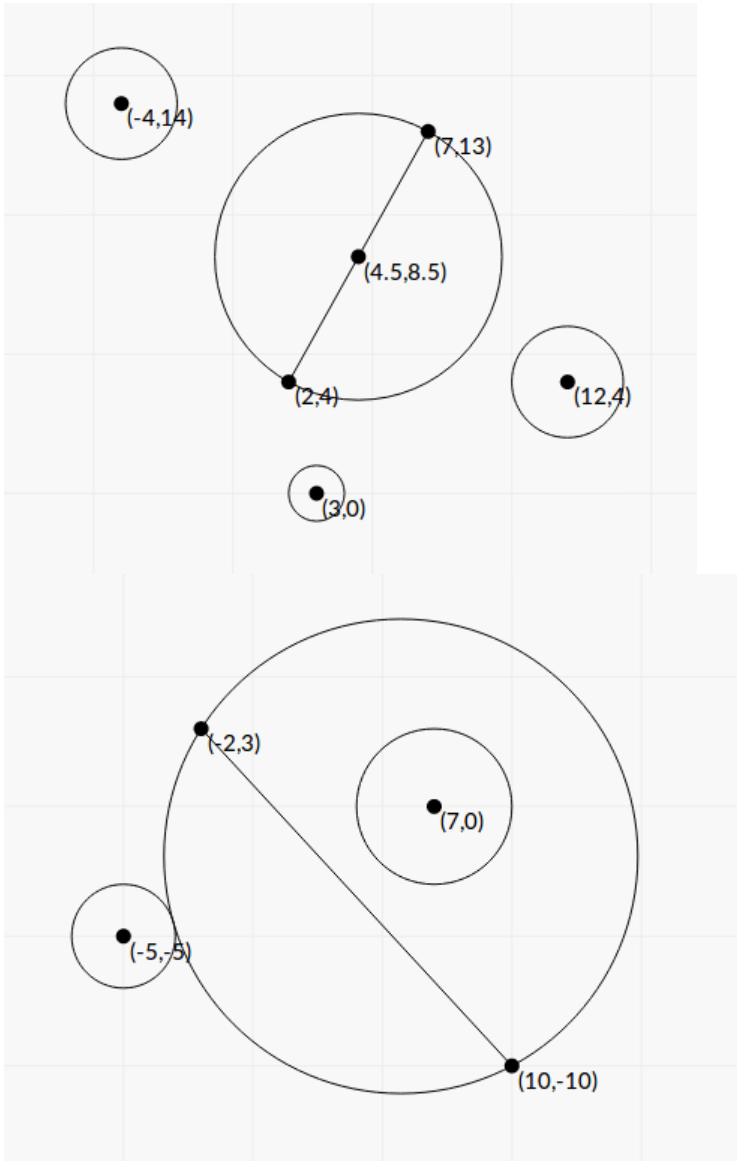
### Examples

| input                                       |
|---|
| 2 4 7 13<br>3<br>3 0 1<br>12 4 2<br>-4 14 2 |
| output                                      |
| 5.1478150705                                |

| input                                |
|--------------------------------------|
| -2 3 10 -10<br>2<br>7 0 3<br>-5 -5 2 |
| output                               |
| 9.1481831923                         |

### Note



## F. Row of Models

time limit per test: 2 seconds

memory limit per test: 512 megabytes

input: standard input

output: standard output

During the final part of fashion show all models come to the stage and stay in one row and fashion designer stays to right to model on the right. During the rehearsal, Izabella noticed, that row isn't nice, but she can't figure out how to fix it.

Like many other creative people, Izabella has a specific sense of beauty. Evaluating beauty of row of models Izabella looks at heights of models. She thinks that row is nice if for each model distance to nearest model with less height (model or fashion designer) to the right of her doesn't exceed  $k$  (distance between adjacent people equals 1, the distance between people with exactly one man between them equals 2, etc).

She wants to make row nice, but fashion designer has his own sense of beauty, so she can at most one time select two models from the row and swap their positions if the left model from this pair is higher than the right model from this pair.

Fashion designer (man to the right of rightmost model) has less height than all models and can't be selected for exchange.

You should tell if it's possible to make at most one exchange in such a way that row becomes nice for Izabella.

### Input

In first line there are two integers  $n$  and  $k$  ( $1 \leq n \leq 5 \cdot 10^5$ ,  $1 \leq k \leq n$ ) — number of models and required distance.

Second line contains  $n$  space-separated integers  $a_i$  ( $1 \leq a_i \leq 10^9$ ) — height of each model. Pay attention that height of fashion designer is not given and can be less than 1.

### Output

Print «YES» (without quotes) if it's possible to make row nice using at most one exchange, and «NO» (without quotes) otherwise.

### Examples

|                  |
|------------------|
| <b>input</b>     |
| 5 4<br>2 3 5 2 5 |
| <b>output</b>    |
| NO               |
| <b>input</b>     |
| 5 2<br>3 6 2 2 1 |
| <b>output</b>    |
| YES              |
| <b>input</b>     |
| 5 2<br>5 3 6 5 2 |
| <b>output</b>    |
| YES              |