

**Codeforces Beta Round #13****A. Numbers**

time limit per test: 1 second  
memory limit per test: 64 megabytes  
input: standard input  
output: standard output

Little Petya likes numbers a lot. He found that number 123 in base 16 consists of two digits: the first is 7 and the second is 11. So the sum of digits of 123 in base 16 is equal to 18.

Now he wonders what is an average value of sum of digits of the number  $A$  written in all bases from 2 to  $A - 1$ .

Note that all computations should be done in base 10. You should find the result as an irreducible fraction, written in base 10.

**Input**

Input contains one integer number  $A$  ( $3 \leq A \leq 1000$ ).

**Output**

Output should contain required average value in format «X/Y», where X is the numerator and Y is the denominator.

**Examples**

<b>input</b>
5
<b>output</b>
7/3

<b>input</b>
3
<b>output</b>
2/1

**Note**

In the first sample number 5 written in all bases from 2 to 4 looks so: 101, 12, 11. Sums of digits are 2, 3 and 2, respectively.

## B. Letter A

time limit per test: 1 second  
memory limit per test: 64 megabytes  
input: standard input  
output: standard output

Little Petya learns how to write. The teacher gave pupils the task to write the letter **A** on the sheet of paper. It is required to check whether Petya really had written the letter **A**.

You are given three segments on the plane. They form the letter **A** if the following conditions hold:

- Two segments have common endpoint (lets call these segments first and second), while the third segment connects two points on the different segments.
- The angle between the first and the second segments is greater than **0** and do not exceed **90** degrees.
- The third segment divides each of the first two segments in proportion not less than **1 / 4** (i.e. the ratio of the length of the shortest part to the length of the longest part is not less than **1 / 4**).

### Input

The first line contains one integer  $t$  ( $1 \leq t \leq 10000$ ) — the number of test cases to solve. Each case consists of three lines. Each of these three lines contains four space-separated integers — coordinates of the endpoints of one of the segments. All coordinates do not exceed  $10^8$  by absolute value. All segments have positive length.

### Output

Output one line for each test case. Print «YES» (without quotes), if the segments form the letter **A** and «NO» otherwise.

### Examples

input
3 4 4 6 0 4 1 5 2 4 0 4 4 0 0 0 6 0 6 2 -4 1 1 0 1 0 0 0 5 0 5 2 -1 1 2 0 1
output
YES NO YES

## C. Sequence

time limit per test: 1 second  
memory limit per test: 64 megabytes  
input: standard input  
output: standard output

Little Petya likes to play very much. And most of all he likes to play the following game:

He is given a sequence of  $N$  integer numbers. At each step it is allowed to increase the value of any number by  $1$  or to decrease it by  $1$ . The goal of the game is to make the sequence non-decreasing with the smallest number of steps. Petya is not good at math, so he asks for your help.

The sequence  $a$  is called non-decreasing if  $a_1 \leq a_2 \leq \dots \leq a_N$  holds, where  $N$  is the length of the sequence.

### Input

The first line of the input contains single integer  $N$  ( $1 \leq N \leq 5000$ ) — the length of the initial sequence. The following  $N$  lines contain one integer each — elements of the sequence. These numbers do not exceed  $10^9$  by absolute value.

### Output

Output one integer — minimum number of steps required to achieve the goal.

### Examples

<b>input</b>
5 3 2 -1 2 11
<b>output</b>
4

  

<b>input</b>
5 2 1 1 1 1
<b>output</b>
1

## D. Triangles

time limit per test: 2 seconds  
memory limit per test: 64 megabytes  
input: standard input  
output: standard output

Little Petya likes to draw. He drew  $N$  red and  $M$  blue points on the plane in such a way that no three points lie on the same line. Now he wonders what is the number of distinct triangles with vertices in red points which do not contain any blue point inside.

### Input

The first line contains two non-negative integer numbers  $N$  and  $M$  ( $0 \leq N \leq 500$ ,  $0 \leq M \leq 500$ ) — the number of red and blue points respectively. The following  $N$  lines contain two integer numbers each — coordinates of red points. The following  $M$  lines contain two integer numbers each — coordinates of blue points. All coordinates do not exceed  $10^9$  by absolute value.

### Output

Output one integer — the number of distinct triangles with vertices in red points which do not contain any blue point inside.

### Examples

input
4 1 0 0 10 0 10 10 5 4 2 1
output
2

  

input
5 5 5 10 6 1 8 6 -6 -7 7 -1 5 -1 10 -4 -10 -8 -10 5 -2 -8
output
7

## E. Holes

time limit per test: 1 second  
memory limit per test: 64 megabytes  
input: standard input  
output: standard output

Little Petya likes to play a lot. Most of all he likes to play a game «Holes». This is a game for one person with following rules:

There are  $N$  holes located in a single row and numbered from left to right with numbers from 1 to  $N$ . Each hole has it's own power (hole number  $i$  has the power  $a_i$ ). If you throw a ball into hole  $i$  it will immediately jump to hole  $i + a_i$ , then it will jump out of it and so on. If there is no hole with such number, the ball will just jump out of the row. On each of the  $M$  moves the player can perform one of two actions:

- Set the power of the hole  $a$  to value  $b$ .
- Throw a ball into the hole  $a$  and count the number of jumps of a ball before it jump out of the row and also write down the number of the hole from which it jumped out just before leaving the row.

Petya is not good at math, so, as you have already guessed, you are to perform all computations.

### Input

The first line contains two integers  $N$  and  $M$  ( $1 \leq N \leq 10^5$ ,  $1 \leq M \leq 10^5$ ) — the number of holes in a row and the number of moves. The second line contains  $N$  positive integers not exceeding  $N$  — initial values of holes power. The following  $M$  lines describe moves made by Petya. Each of these line can be one of the two types:

- 0  $a$   $b$
- 1  $a$

Type 0 means that it is required to set the power of hole  $a$  to  $b$ , and type 1 means that it is required to throw a ball into the  $a$ -th hole. Numbers  $a$  and  $b$  are positive integers do not exceeding  $N$ .

### Output

For each move of the type 1 output two space-separated numbers on a separate line — the number of the last hole the ball visited before leaving the row and the number of jumps it made.

### Examples

input
8 5 1 1 1 1 1 2 8 2 1 1 0 1 3 1 1 0 3 4 1 2
output
8 7 8 5 7 3