Assignment 2 Statement v1.0

Declaration

#	Name	Difficulty	Score
1	Broken Chronograph	Easy	20
2	Late Autumn Night's Dream	Easy+	20
3	Starry Road to Tomorrow	Medium	20
4	Cutcraft	Medium+	20
5	Moonlit Sorcery	Hard	20

It's guaranteed that all the inputs are valid and follow the constraints, **so there's no need to validate.**

Some of the input-output cases have **explanations, which are to help you understand the problem.**

~~In case the assignment is too difficult, we make a solution video for you: BV1GJ411x7h7.~~

1. Broken Chronograph

Description

Alice Megatron is tired of solving integrals, and she wants a computer program to do it for her. However, she is busy designing problems for OJ, so she asks you to write part of the program for her, just needs you to implement the function of polynomial integration.

Input

The first line contains one integer n, indicating that there are n terms in the polynomial.

The second line contains n floating numbers, the i-th number a_i is the coefficient of the term x^i.

The third line contains 2 floating numbers, which are the integral bounds l and r.

More specifically, you are asked to calculate this integral:

$$\int_l^r (a_0 + a_1 x + a_2 x^2 + \cdots + a_{n-1} x^{n-1})\,\mathrm{d}x$$

Output

Output the result of the integral.

Your answer is considered correct if its absolute error doesn't exceed 10^{-4}.

Constraint

For all the test cases, $-100 \leq a_i,\ l,\ r \leq 100$.

It’s guaranteed that the absolute value of the result of the integral doesn’t exceed 10^6.

Samples

Input 1

```
3
1.1 4.5 1.4
1.91 9.810
```

Output 1

```
654.3301927
```

2. Late Autumn Night's Dream

Description

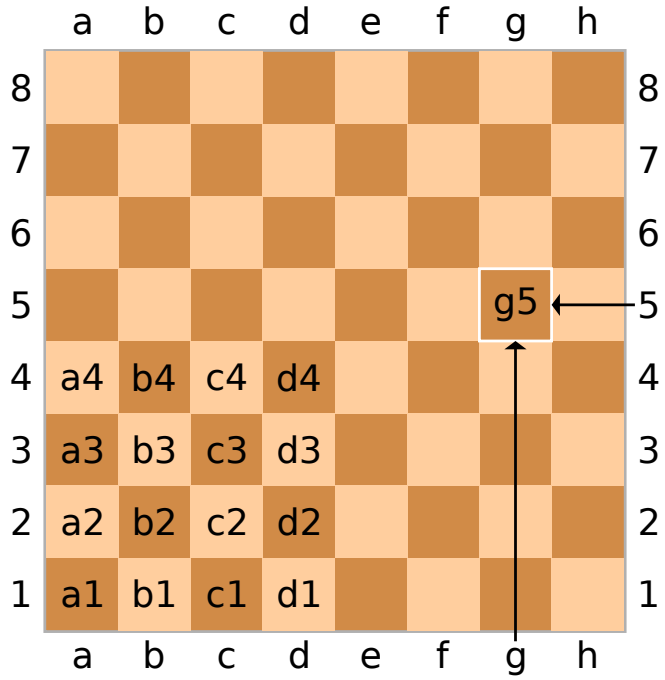
Hi! Bob says, I can't make up an interesting description for the problem, but I have to let you solve the problem. You may have heard of the eight queens puzzle, if not, the search engine will help you. I will place the 8 queens for you, and you need to tell whether it is a solution for eight queens puzzle or not.

Here is the description of eight queens puzzle from Wikipedia: The eight queens puzzle is the problem of placing eight chess queens on an 8×8 chessboard so that no two queens threaten each other; thus, a solution requires that no two queens share the same row, column, or diagonal.

Input

The first line contains one integer T, indicating that there are T test cases.

There are T lines following, each line as the input for one test case. Each line contains 8 strings, each string contains a letter a, b, c, d, e, f, g, h concatenated with a letter 1, 2, 3, 4, 5, 6, 7, 8, and locates a grid on chessboard.



Algebraic Notation in International Chess

Output

Output T lines, each line represents the output for one test case, respectively.

For each test case, if it is a solution, output `Yes`, if not, output `No`.

Constraint

For all test cases, $1 \leq T \leq 100$.

Samples

Input 1

```
1
a1 b7 c5 d8 e2 f4 g6 h3
```

Output 1

```
Yes
```

Input 2

```
3
a1 b7 c5 d8 e2 f4 g6 h3
a1 b7 c5 d8 e2 f4 g6 h4
a5 b3 c1 d7 e2 f8 g6 h4
```

Output 2

```
Yes
No
Yes
```

3. Starry Road to Tomorrow

Description

Carol invited N pigeon friends to his home for dinner and prepared N seats. The pigeon friends all agreed and reneged, so the angry Carol has to drive the pigeons to the seats herself. To simplify the problem, assume that N pigeons' homes (starting positions) and N seats are on a straight line and that their coordinates are represented by an integer with the pigeons' home coordinates $s_1, s_2, ..., s_n$, and the coordinates of the seats are $d_1, d_2, ..., d_n$. The pigeons rush at the same speed, 1 per second. In order to start as soon as possible, Carol wants to give each pigeon a destination so that they can sit in their seats in the shortest possible time, so she finds a clever friend to help her figure out this shortest possible time.

Constraint

For 50% test cases, $1 \leq N \leq 8,\ 0 \leq s_i, d_i \leq 10^3$.

For all test cases, $1 \leq N \leq 10^4,\ 0 \leq s_i, d_i \leq 10^7$.

Input

The first line contains one integer N.

The second line contains N integers $s_1, s_2, ..., s_n$.

The third line contains N integers $d_1, d_2, ..., d_n$.

Output

Output one single integer as the answer.

Samples

Input 1

```
1
1
5
```

Output 1

```
4
```

Explanation to sample 1

It takes the only pigeon 4 seconds to move from `1` to `5`.

Input 2

```
9
1 3 5 7 9 8 6 4 2
12 89 56 23 45 78 67 90 34
```

Output 2

```
81
```

Explanation to sample 2

You can arrange the pigeons so that it takes 81 seconds for all pigeons to sit.

4. Cutcraft

Description

Dave has recently been playing a game called Cutcraft. This game creates a three-dimensional world whose lengths in three dimensions are X, Y, Z, where $X, Y, Z \in \mathbb{N}^*$. At some coordinates (x_i, y_i, z_i)(where $x_i,\ y_i,\ z_i \in \mathbb{N}^*$) there may be blocks. You can imagine that many small cubes are stacked into a big cuboid, the world looks like the big cuboid, and the position of each small cube can be described by a three-dimensional coordinate. Some of the blocks are wood blocks, and Dave can cut down the wood block at one coordinate at a time, however the mystery man, Mod, gives Dave a superpower so that when Dave cuts down a wood block, its adjacent wood blocks in 6 directions will also be cut, and this superpower will also work on the wood blocks that are cut due to this superpower, so the wood blocks adjacent to these adjacent wood blocks will also be cut until there are no more adjacent wood blocks. Now Dave wants to know how many cuts he needs to cut all the wood blocks.

For simplicity, a coordinate is denoted by 1 if there is wood block on it, otherwise it is denoted by 0.

Constraint

For 80% test cases, $Z = 1$, in other words, it's a two-dimensional world.

For all test cases, $1 \leq X, Y, Z \leq 20$.

Hint

To get full score on this problem, you may use three dimensional array.

Input

The first line contains three integer X, Y, Z.

There are $X * Z$ lines following, every X lines indicates a XY plane, each line contains Y characters (`0` or `1`).

Output

Output one single integer as the answer.

Samples

Input 1

```
6 6 1
110001
100111
010000
110011
000100
111100
```

Output 1

```
5
```

Explanation to sample 1

Here we use non-zero integer to represent the number of cuts, the same number means these woods would be cut at the same time.

```
110002
100222
030000
330044
000500
555500
```

Input 2

```
4 4 4
1100
1001
0100
1101
1000
0001
0001
1001
0110
0101
0000
1000
0000
0001
```

```
1111
0000
```

Output 2

```
4
```

Explanation to sample 2

```
1100 // the first XY plane, next to the second XY plane
1002
0300
3302

1000 // the second XY plane, between the first and the third XY plane
0002
0002
3002

0440 // the third XY plane, between the second and the fourth XY plane
0402
0000
3000

0000 // the fourth XY plane, next to the third XY plane
0002
2222
0000
```

5. Moonlit Sorcery

Description

Elaina was studying magic when she made a surprising discovery: suppose that each point on the edge of a circular magic field $x^2 + y^2 = r^2$, where r is the radius of circle, can be denoted as coordinates (x_i, y_i), if both x_i and y_i are integers, the point will play a key role in the the magic field. So she wanted to know how many points are on the circular magic field that satisfy this condition. Of course, due to Elaina's “excessive crumbliness” (屑, in Chinese), the centers of the magic circles she releases are all at coordinate $(0, 0)$.

Constraint

For 70% test cases, $1 \leq r \leq 10^3$.

For 90% test cases, $1 \leq r \leq 10^6$.

For all test cases, $1 \leq r \leq 10^9$.

Hint

To get full score on this problem, you should optimize the program so that it iterates less than r times.

Input

The first line contains one integer r.

Output

Output one single integer as the answer.

Samples

Input 1

```
4
```

Output 1

```
4
```

Explanation to sample 1

There are 4 points meeting the requirement, $(0, 4), (4, 0), (0, -4), (-4, 0)$.

Input 2

```
5
```

Output 2

```
12
```

Explanation to sample 2

There are 12 points meeting the requirement, $(0, 5), (3, 4), (4, 3), ...$