Assignment 2 Statement v1.1.1

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	From Dawn Till Dusk	Medium	20
5	Moonlit Sorcery	Hard	20

There is **no need to validate** the inputs because they are all guaranteed to be valid and follow the constraints.

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, $1 \leq n \leq 20$, $-100 \leq a_i$, l, $r \leq 100$.

It is guaranteed that the absolute value of the integral result will not 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

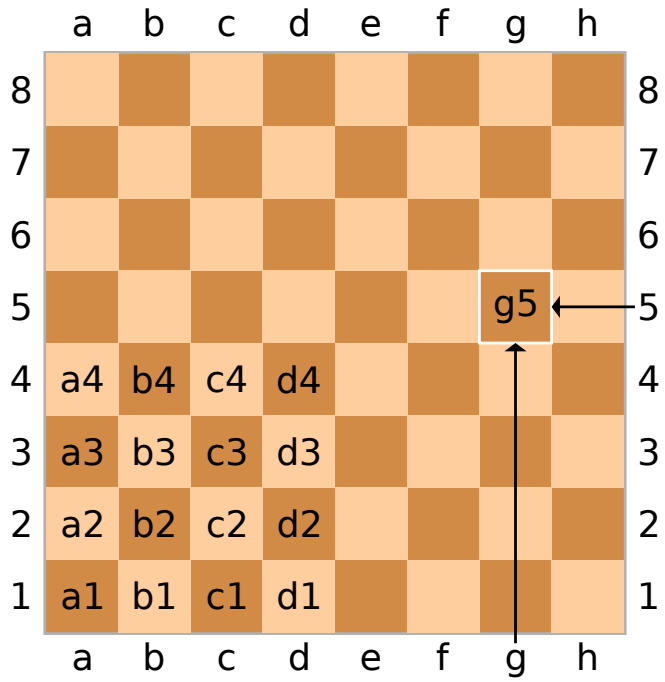
Hi! Bob says, I can't make up an interesting description for the problem, but I have to let you solve the problem. You may have heard of the eight queens puzzle, if not, the search engine will help you. I will place the 8 queens for you, and you need to tell whether it is a solution for eight queens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

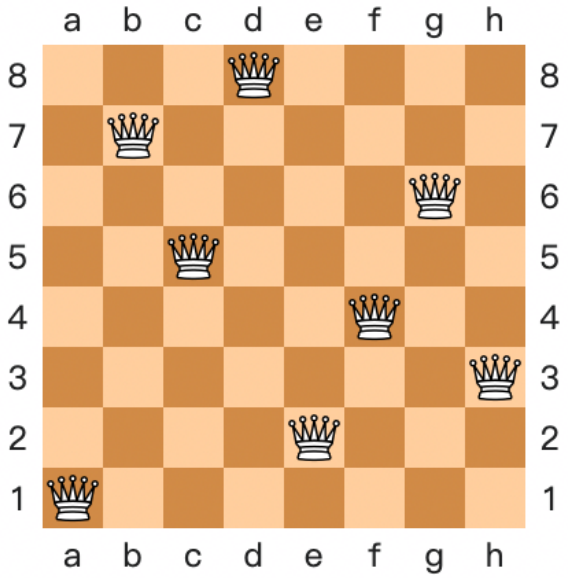
Input 1

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

Output 1

```
Yes
```

Explanation to sample 1



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.

Input 3

```
9
37 41 64 46 50 53 40 43 61
84 53 56 89 9 1 63 17 20
```

Output 3

```
36
```

4. From Dawn Till Dusk

Description

Dave is invited to Steve's world. Let's simply consider this world to be a two-dimensional plane with a Cartesian coordinate system. Steve allows Dave to place blocks at coordinates (x_i, y_i), where x_i and y_i are both integers, and coordinates (x_i, y_i) is

adjacent to the coordinates $(x_i - 1, y_i)$, $(x_i + 1, y_i)$, $(x_i, y_i - 1)$, $(x_i, y_i + 1)$. Given an integer n, Dave wants to create an "Artwork". In detail, he wants to place some blocks to form a shape that satisfies the following conditions:

1. The shape is **connected**, i.e. any two blocks are either adjacent or connected by other blocks.
2. Each block is adjacent to an **even** number of blocks.
3. There are exactly n blocks that **all their adjacent coordinates have blocks**.

Dave first places a block at $(0, 0)$, then he doesn't know how to do it next, so he asks you for help. For a particular n, there may be several different "Artwork", and you need to create one of them.

There may be multiple solutions; however, you only need to print one.

It is strongly advised not to exchange ideas before passing the problem. The process of thinking is interesting!

Constraint

For 30% test cases, n is even.

For 60% test cases, n can be factorized into at least two integers.

For all test cases, $1 \leq n \leq 500$.

Input

The only line contains an integer n.

Output

In the first line, print an integer k - the number of blocks you place, and please make sure $0 \leq k \leq 10^5$.

In the following k lines, each line contains two integers x_i, y_i - the coordinates of the i-th blocks you place, and please also make sure the absolute value of coordinates doesn't exceed 10^9.

Sample

Input 1

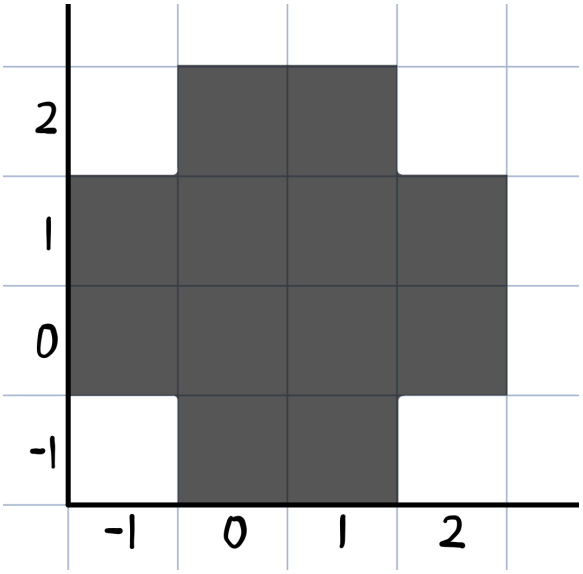
```
4
```

Output 1

```
11
-1 0
-1 1
0 -1
0 1
0 2
1 -1
1 0
1 1
1 2
2 0
2 1
```

Explanation to sample 1

Note: your program's output does not have to be identical to the sample.



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, $0 \leq r \leq 10^3$.

For 90% test cases, $0 \leq r \leq 10^6$.

For all test cases, $0 \leq r \leq 10^9$.

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, $(0, 5), (3, 4), (4, 3), ...$