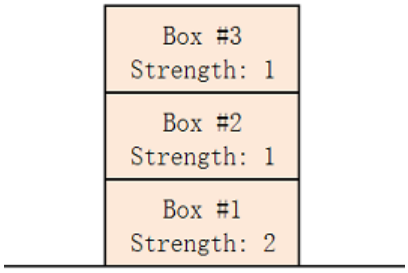
Codeforces Round #228 (Div. 1)

A. Fox and Box Accumulation

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

Fox Ciel has n boxes in her room. They have the same size and weight, but they might have different strength. The i-th box can hold at most x_i boxes on its top (we'll call x_i the strength of the box).

Since all the boxes have the same size, Ciel cannot put more than one box directly on the top of some box. For example, imagine Ciel has three boxes: the first has strength 2, the second has strength 1 and the third has strength 1. She cannot put the second and the third box simultaneously directly on the top of the first one. But she can put the second box directly on the top of the first one, and then the third box directly on the top of the second one. We will call such a construction of boxes a *pile*.



Fox Ciel wants to construct piles from all the boxes. Each pile will contain some boxes from top to bottom, and there cannot be more than x_i boxes on the top of i-th box. What is the minimal number of piles she needs to construct?

Input
The first line contains an integer n ($1 \le n \le 100$). The next line contains n integers $x_1, x_2, ..., x_n$ ($0 \le x_i \le 100$).

Output
Output a single integer — the minimal possible number of piles.

Sample test(s)

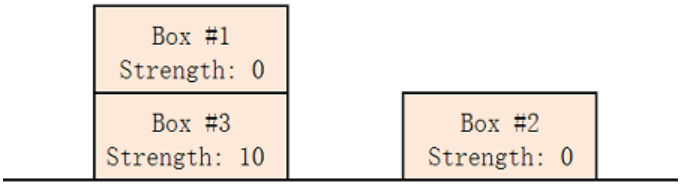
input
3 0 0 10
output
2

input
5 0 1 2 3 4
output
1

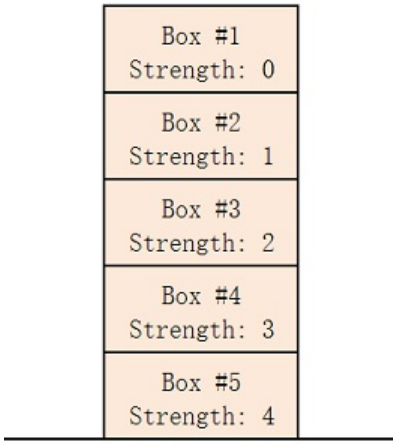
input
4 0 0 0 0
output
4

input
9 0 1 0 2 0 1 1 2 10
output
3

Note
In example 1, one optimal way is to build 2 piles: the first pile contains boxes 1 and 3 (from top to bottom), the second pile contains only box 2.



In example 2, we can build only 1 pile that contains boxes 1, 2, 3, 4, 5 (from top to bottom).



B. Fox and Minimal path

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

Fox Ciel wants to write a task for a programming contest. The task is: "You are given a simple undirected graph with n vertexes. Each its edge has unit length. You should calculate the number of shortest paths between vertex 1 and vertex 2."

Same with some writers, she wants to make an example with some certain output: for example, her birthday or the number of her boyfriend. Can you help her to make a test case with answer equal exactly to k?

Input

The first line contains a single integer k ($1 \le k \le 10^9$).

Output

You should output a graph G with n vertexes ($2 \le n \le 1000$). There must be exactly k shortest paths between vertex 1 and vertex 2 of the graph.

The first line must contain an integer n. Then adjacency matrix G with n rows and n columns must follow. Each element of the matrix must be 'N' or 'Y'. If G_{ij} is 'Y', then graph G has a edge connecting vertex i and vertex j. Consider the graph vertexes are numbered from 1 to n.

The graph must be undirected and simple: G_{ii} = 'N' and $G_{ij} = G_{ji}$ must hold. And there must be at least one path between vertex 1 and vertex 2. It's guaranteed that the answer exists. If there multiple correct answers, you can output any of them.

Sample test(s)

input
```
2
```
output
```
4
NNYY
NNYY
YYNN
YYNN
```

input
```
9
```
output
```
8
NNYYYNNN
NNNNNYYY
YNNNNYYY
YNNNNYYY
YNNNNYYY
NYYYYNNN
NYYYYNNN
NYYYYNNN
```

input
```
1
```
output
```
2
NY
YN
```

Note

In first example, there are 2 shortest paths: 1-3-2 and 1-4-2.

In second example, there are 9 shortest paths: 1-3-6-2, 1-3-7-2, 1-3-8-2, 1-4-6-2, 1-4-7-2, 1-4-8-2, 1-5-6-2, 1-5-7-2, 1-5-8-2.

C. Fox and Card Game

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

Fox Ciel is playing a card game with her friend Fox Jiro. There are n piles of cards on the table. And there is a positive integer on each card.

The players take turns and Ciel takes the first turn. In Ciel's turn she takes a card from the top of any non-empty pile, and in Jiro's turn he takes a card from the bottom of any non-empty pile. Each player wants to maximize the total sum of the cards he took. The game ends when all piles become empty.

Suppose Ciel and Jiro play optimally, what is the score of the game?

Input

The first line contain an integer n ($1 \le n \le 100$). Each of the next n lines contains a description of the pile: the first integer in the line is s_i ($1 \le s_i \le 100$) — the number of cards in the i-th pile; then follow s_i positive integers $c_1, c_2, ..., c_k, ..., c_{s_i}$ ($1 \le c_k \le 1000$) — the sequence of the numbers on the cards listed from top of the current pile to bottom of the pile.

Output

Print two integers: the sum of Ciel's cards and the sum of Jiro's cards if they play optimally.

Sample test(s)

input

```
2
1 100
2 1 10
```

output

```
101 10
```

input

```
1
9 2 8 6 5 9 4 7 1 3
```

output

```
30 15
```

input

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

output

```
18 18
```

input

```
3
3 1000 1000 1000
6 1000 1000 1000 1000 1000 1000
5 1000 1000 1000 1000 1000
```

output

```
7000 7000
```

Note

In the first example, Ciel will take the cards with number 100 and 1, Jiro will take the card with number 10.

In the second example, Ciel will take cards with numbers 2, 8, 6, 5, 9 and Jiro will take cards with numbers 4, 7, 1, 3.

D. Fox and Perfect Sets

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

Fox Ciel studies number theory.

She thinks a non-empty set S contains non-negative integers is *perfect* if and only if for any $a, b \in S$ (a can be equal to b), $(a\ xor\ b) \in S$. Where operation xor means exclusive or operation (*http://en.wikipedia.org/wiki/Exclusive_or*).

Please calculate the number of perfect sets consisting of integers not greater than k. The answer can be very large, so print it modulo 1000000007 $(10^9 + 7)$.

Input

The first line contains an integer k ($0 \leq k \leq 10^9$).

Output

Print a single integer — the number of required sets modulo 1000000007 $(10^9 + 7)$.

Sample test(s)

input
1
output
2

input
2
output
3

input
3
output
5

input
4
output
6

Note

In example 1, there are 2 such sets: {0} and {0, 1}. Note that {1} is not a perfect set since 1 xor 1 = 0 and {1} doesn't contain zero.

In example 4, there are 6 such sets: {0}, {0, 1}, {0, 2}, {0, 3}, {0, 4} and {0, 1, 2, 3}.

E. Fox and Meteor Shower

time limit per test: 6 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

There is a meteor shower on the sky and there are n meteors. The sky can be viewed as a 2D Euclid Plane and the meteor is point on this plane.

Fox Ciel looks at the sky. She finds out that the orbit of each meteor is a straight line, and each meteor has a constant velocity. Now Ciel wants to know: what is the maximum number of **meteors** such that any pair met at the same position at a certain time? Note that the time is not limited and can be also negative. The meteors will never collide when they appear at the same position at the same time.

Input

The first line contains an integer n ($1 \le n \le 1000$). Each of the next n lines contains six integers: $t_1, x_1, y_1, t_2, x_2, y_2$ — the description of a meteor's orbit: at time t_1, the current meteor is located at the point (x_1, y_1) and at time t_2, the meteor is located at point (x_2, y_2) ($-10^6 \le t_1, x_1, y_1, t_2, x_2, y_2 \le 10^6$; $t_1 \ne t_2$).

There will be no two meteors are always in the same position for any time.

Output

Print a single integer — the maximum number of meteors such that any pair met at the same position at a certain time.

Sample test(s)

input

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

output

```
2
```

input

```
3
-1 -1 0 3 3 0
0 2 -1 -1 3 -2
-2 0 -1 6 0 3
```

output

```
3
```

input

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

output

```
1
```

input

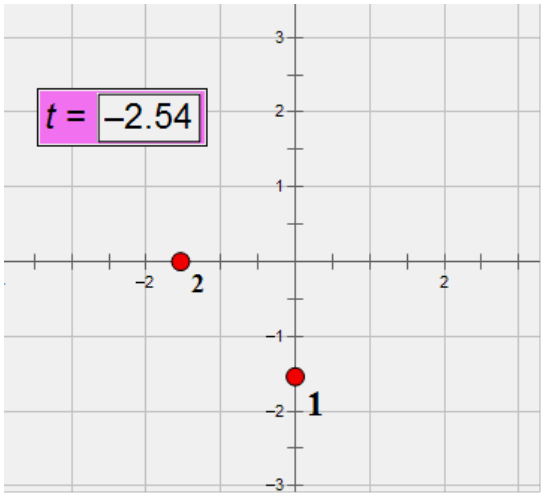
```
1
0 0 0 1 0 0
```

output

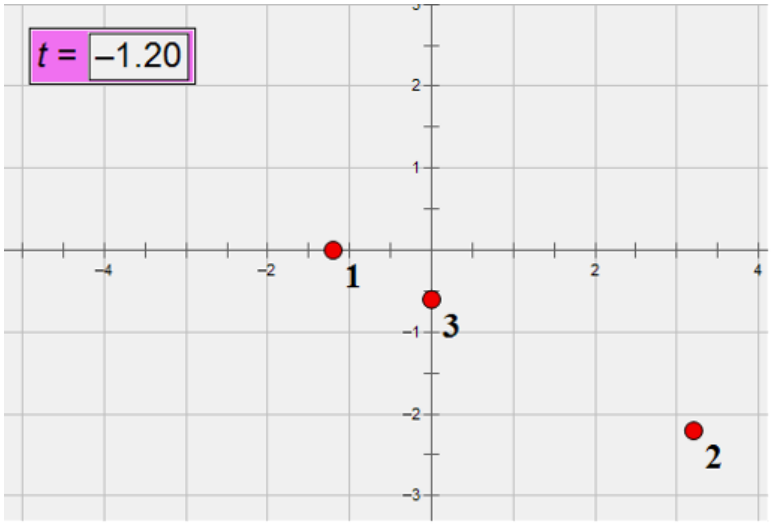
```
1
```

Note

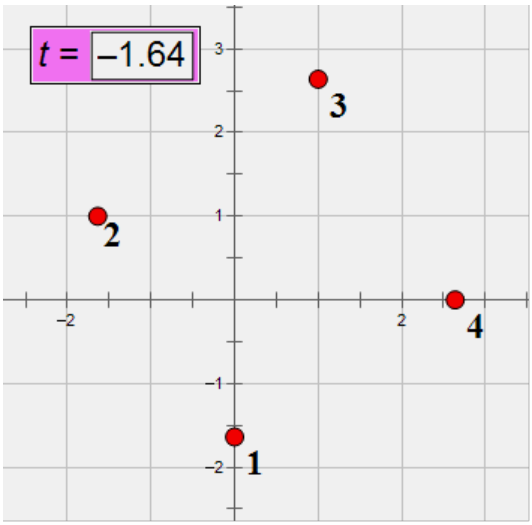
In example 1, meteor 1 and 2 meet in t=-1 at (0, 0).



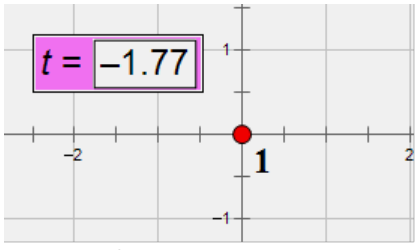
In example 2, meteor 1 and 2 meet in t=1 at (1, 0), meteor 1 and 3 meet in t=0 at (0, 0) and meteor 2 and 3 meet in t=2 at (0, 1).



In example 3, no two meteor meet.



In example 4, there is only 1 meteor, and its velocity is zero.



If your browser doesn't support animation png, please see the gif version here:

http://assets.codeforces.com/images/388e/example1.gif

http://assets.codeforces.com/images/388e/example2.gif

http://assets.codeforces.com/images/388e/example3.gif

http://assets.codeforces.com/images/388e/example4.gif