Problem A. Another 2048 Problem

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

The International Association of "2048" players published rules of the 2048 game for Division 2.

Division 2 player have some numbers at the start (not only powers of two). Every time he can choose two numbers of the same value from them and merge these two numbers into their sum. And these two numbers disappear meanwhile.

If he can get 2048 from a set of numbers with this operation, we call this multiset «winning».

You have n numbers $A_1, \ldots, An$. Find out how many subsequences of A are «winning» ones. Answer can be very large, so output it modulo 998244353.

Input

There are no more than 70 test cases, terminated by a line containing a single zero.

For each test case, the first line contains an integer n ($1 \le n \le 10^5$). The next line contains n integers a_i ($0 \le a_i \le 2048$).

Size of the input file does not exceed 5.5 mebibytes.

Output

For each test case print one integer — answer to the problem.

Examples

standard input	standard output
5 513 511 256 512 256 8 512 512 512 512 512 512 512 512 3 1024 256 512 0	0 163 0

Problem B. Big Kingdom

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

You have a big kingdom with the infinite area and n guards guarding the kingdom.

The i-th guard stands at the position (x_i, y_i), and his walking speed is v_i.

If a point can be reached by a guard, and the time this guard walking to this point is strictly less than other guards, this point is in the charge of this guard.

For every guard check if the area in the charge of him is infinite.

Input

The input file consists of no more than 80 test cases.

The first line of the each test case contains one integer n ($1 \le n \le 500$). Each of the following n lines contain three integers x_i,y_i,v_i ($0 \le |x_i|, |y_i|, v_i \le 10^4$).

The input is terminated by test case with $n = 0$, which shouldn't be processed.

Output

Print a string consisting of n characters. If the area in the charge of the i-th guard isn't infinite, the i-th character is '0', otherwise it is '1'.

Examples

standard input	standard output
3 0 0 3 1 1 2 2 2 1 0	100

Problem C. Construct The Array

Input file:	*standard input*
Output file:	*standard output*
Time limit:	7 seconds
Memory limit:	256 mebibytes

Teacher Mai finds that many problems about arithmetic function can be reduced to the following problem:

Maintain an array a with index from 1 to l. There are two kinds of operations:

1. Add v to a_x for every x that $gcd(x, n) = d$.
2. Query $\sum_{i=1}^{x} a_i$.

Input

There are multiple test cases, terminated by a line "`0 0`".

For each test case, the first line contains two integers l, Q ($1 \le l, Q \le 5 \cdot 10^4$), indicating the length of the array and the number of the operations.

In following Q lines, each line indicates an operation, and the format is "`1 n d v`" or "`2 x`" ($1 \le n, d, v \le 2 \cdot 10^5$, $1 \le x \le l$). Total size of the input file does not exceed 7 mebibytes.

Output

For each case, output in separate string the answer to each query.

Examples

standard input	standard output
6 4 1 4 1 2 2 5 1 3 3 3 2 3 0 0	6 7

Problem D. Dictator

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Dictator Nu I has a kingdom consisting of n cities. He has planned the transportation of the kingdom. Every pair of cities has exactly a one-way road.

He wants develop this kingdom from one city to one city.

Dictator now is considering developing the city w. And he hopes that for every city u he has developed, there is a one-way road from u to w, or there are two one-way roads from u to v, and from v to w, where city v has been developed before.

He gives you the map of the kingdom. Hope you can give a proper order to develop this kingdom.

Input

There are no more than 90 test cases, terminated by a line '0'.

For each test case, the first line contains an integer n ($1 \leq n \leq 500$).

The following are n lines, the i-th line contains a string consisting of n characters. If the j-th characters is 1, there is a one-way road from city i to city j.

Cities are labelled from 1.

Output

If there is no solution just output "-1". Otherwise output n integers representing the order to develop this kingdom. If there are multiple solutions, print any of them.

Example

standard input	standard output
3 011 001 000 0	1 2 3

Problem E. Electricity and Magic

Input file:	*standard input*
Output file:	*standard output*
Time limit:	14 seconds
Memory limit:	256 mebibytes

The Wizard of Yendor has a board of n rows and m columns. There is a electric light in each cell.

He can flip some lights: if this light is on, turn it off, else turn it on.

He can choose a $cell(i, j)$, and he has following two operations:

1. Flip the light on the cells which share a common edge with $cell(i, j)$.
2. Flip the light on the cells which share a common edge with $cell(i, j)$ and in $cell(i, j)$ itself.

You are given the initial state of board. Output the minimum number of operations to turn off the all the lights.

Input

There are multiple test cases, terminated by a line "`0 0`".

For each test case, the first line contains two integers n, m ($1 \le n, m \le 10$).

In following n lines, each line contains a string consisting of m characters, representing the initial state (0 means off, 1 means on).

Total size of the input file does not exceed 20 kibibytes.

Output

For each case, print in the separate line the minimum number operations.

Example

standard input	standard output
3 3 111 111 111 3 3 000 010 000 0 0	3 2

Problem F. Fight

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

A monster has invaded kingdom of Erathia, and famous hero Solmyr wants to kill it.

Monster initially has h HP. And it will die if HP is less than 1.

Solmyr and monster take turns to do their action. In one round, Solmyr can attack the monster so that the HP of the monster will be reduced by a. At the end of this round, the HP of monster will be increased by b.

After k consecutive round's attack, Solmyr must take a rest in this round. However, he can also choose to take a rest in any round.

Output "`YES`" if Solmyr can kill this monster, else output "`NO`".

Input

There are no more than 450 test cases, terminated by a line with four zeroes.

For each test case, the first line contains four integers h, a, b, k ($1 \leq h,\ a,\ b,\ k \leq 10^9$).

Output

For each case, output "`YES`" if Solmyr can kill this monster, else output "`NO`".

Example

standard input	standard output
5 3 2 2 0 0 0 0	NO

Problem G. Go and restore!

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	256 mebibytes

Teacher Mai has a multiplication table in base p.

For example, the following is a multiplication table in base 4:

```
* 0 1 2 3
0 00 00 00 00
1 00 01 02 03
2 00 02 10 12
3 00 03 12 21
```

But a naughty kid maps numbers $0 \ldots p-1$ into another permutation and shuffle the multiplication table.

For example Teacher Mai only can see:

```
1*1=11 1*3=11 1*2=11 1*0=11
3*1=11 3*3=13 3*2=12 3*0=10
2*1=11 2*3=12 2*2=31 2*0=32
0*1=11 0*3=10 0*2=32 0*0=23
```

Teacher Mai wants you to recover the multiplication table. Output the permutation number $0 \ldots p-1$ mapped into.

It's guaranteed the solution is unique.

Input

There are no more than 150 test cases, terminated by a line "0".

For each test case, the first line contains one integer p ($2 \le p \le 500$).

In following p lines, each line contains $2p$ integers.The $(2j+1)$-th number x and $(2j+2)$-th number y in the i-th line indicates equation $i \cdot j = xy$ in the shuffled multiplication table. Size of the input file does not exceed 47 mebibytes.

Output

For each case, output one line, containing p integers, indicating the permutation number $0 \ldots p-1$ mapped into.

Examples

standard input	standard output
4 2 3 1 1 3 2 1 0 1 1 1 1 1 1 1 1 3 2 1 1 3 1 1 2 1 0 1 1 1 2 1 3 0	1 3 2 0

Problem H. Hidden Integer

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

David Blane has an hidden integer x.

He does the following operations k times. In the i-th operation, x becomes the least integer no less than x, which is the multiple of i.

He wants to know what is the number x now.

Input

There are no more than 510 test cases, terminated by a line "`0 0`".

For each test case, the only one line contains two integers x,k($1 \le x \le 10^{10}$, $1 \le k \le 10^{10}$).

Output

For each test case, output one line, containing value of x.

Example

standard input	standard output
2520 10 2520 20 0 0	2520 2600

Problem I. Infinite String

Input file:	*standard input*
Output file:	*standard output*
Time limit:	4 seconds
Memory limit:	256 mebibytes

Given an infinite periodic binary string S with index counting from 0. That means $S = TTTT\ldots$, where T is the period of string S. For example, $T = 101$, then $S = 101101101101\ldots$.

$S[l, r]$ is the sub-string of S. We define $f[l, r]$ is the value when regarding $S[l, r]$ as a binary number.

Please count the number of binary strings T with length k, where T is the period of string S, satisfying the condition: $f[l, r] = x(\mod p)$.

The number can be very large, just output the number modulo $10^9 + 7$.

Input

There are no more than 162 test cases, terminated by a line with five zeroes.

For each test case, there is a line contains five numbers p ($2 < p < 10^{18}$, p is a prime number), x ($0 \le x < p$), l, r ($0 \le l \le r \le 10^{18}$) and k ($1 \le k \le 10^{18}$).

Output

For each test case, print the answer modulo $10^9 + 7$.

Examples

standard input	standard output
3 0 1 2 1 233 23 2333 23333 23 233 1 1 2 23 0 0 0 0 0	2 36003 2097152

Problem J. Just do it

Input file:	*standard input*
Output file:	*standard output*
Time limit:	5 seconds
Memory limit:	256 mebibytes

You are given a matrix of n rows and n columns, you should calculate the permanent of this. But this matrix is special, nearly all the elements are 1. Only the cells on the main diagonal are modified.

You are given n integers a_i. You should calculate permanents of m matrices. The size of i-th matrix is $n + i - 1$.

In i-th matrix, $w_{x,y} = a_x$, if $x = y$ and $x \leq n$, $w_{x,y} = 0$ if $x = y$ and $x > n$, and 1 if $x \neq y$.

The number can be very large, just output the number modulo 998244353.

Input

There are multiple test cases, terminated by a line "`0 0`".

For each test case, the first line contains two integers n and m $(1 \leq n, m \leq 10^5)$.

The following one line contains n integers a_i,$(0 \leq a_i \leq 10^6)$.

Total size of the input file does not exceed 1.2 mebibytes.

Output

For each test case, print k lines, each containing an integer, indicating the permanent of the i-th matrix.

Example

standard input	standard output
3 2 2 3 3 0 0	28 46

Problem K. K nodes and K edges

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Teacher Mai has a directed graph with k nodes and k edges. This graph is special: Out degree of each node is 1, and there is no self loop.

For every node Teacher Mai wrote down a set of nodes which directly links to this node.

For example, the graph contains 4 edges: $\{1 \to 2, 2 \to 4, 3 \to 1, 4 \to 1\}$, the set of each node is $\{3, 4\}, \{1\}, \{\}, \{2\}$.

But Teacher Mai found that he forgot writing which node the set belonged to.

Teacher Mai wanted to recover it, but he found there are many graphs with the same node sets.

You should count the number of different graphs have the same node sets as the given one.

The number can be very large, just output the number modulo $(10^9 + 7)$.

If there is no solution, the answer must be 0.

Input

There are no more than 80 test cases, terminated by a line with one zero.

For each test case, the first line contains a integer n $(1 \leq k \leq 1000)$.

The following are k lines representing the set of each node. For every line, there is a integer p first, indicating the size of the set. Then there are p integers, indicating the node with index from 1 to k in this set.

Output

For each test case print the answer of problem — number of different graphs from the statement modulo $10^9 + 7$.

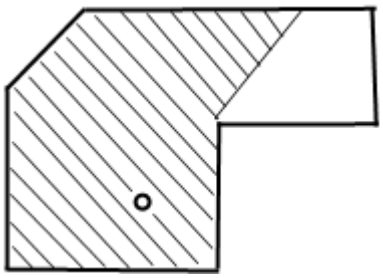
Example

standard input	standard output
6 1 1 0 0 0 2 2 3 3 4 5 6 0	38

Problem L. Light Source

Input file:	*standard input*
Output file:	*standard output*
Time limit:	8 seconds
Memory limit:	256 mebibytes

In the room, shaped as the simple polygon with N vertices (i.e. closed polyline without self-intersections), an light source is put in the point (X_c, Y_c). Find out an area of illuminated part of the room.



Input

First line of the input file contains one integer T — number of the test cases ($1 \le T < 20$). First line of each test case contains two real numbers X_c and Y_c — coordinates of the light source. Next line contains one integer N — number of vertices of the polyline ($3 \le N \le 5 \cdot 10^4$). Each of the next N lines contain coordinate of one vertices of the polyline — two real numbers X_i and Y_i. All coordinates are given with no more than 4 digits after the decimal point and does not exceed 1000 by absolute value. It is guaranteed that light source is strictly inside the room. Coordinates of the points are given in counterclockwise order.

Output

For each test case print one integer — area of illuminated part of the room with absolute error 10^{-2} or better.

Examples

standard input	standard output
1 1 2 5 0 0 1 0 1 1 3 3 0 3	5.00