A. CRB and Apple

In Codeland there are many apple trees.
One day CRB and his girlfriend decided to eat all apples of one tree.
Each apple on the tree has height and deliciousness.
They decided to gather all apples from top to bottom, so an apple can be gathered only when it has equal or less height than one just gathered before.
When an apple is gathered, they do one of the following actions.

1. CRB eats the apple.
2. His girlfriend eats the apple.
3. Throw the apple away.

CRB(or his girlfriend) can eat the apple only when it has equal or greater deliciousness than one he(she) just ate before.
CRB wants to know the maximum total number of apples they can eat.
Can you help him?

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains a single integer N denoting the number of apples in a tree.
Then N lines follow, i-th of them contains two integers H_i and D_i indicating the height and deliciousness of i-th apple.
1 ≤ T ≤ 48
1 ≤ N ≤ 1000
1 ≤ H_i , D_i ≤ 10^9

Output

For each test case, output the maximum total number of apples they can eat.

Sample Input

```
1
5
1 1
2 3
3 2
4 3
5 1
```

Sample Output

```
4
```

B. CRB and Candies

CRB has N different candies. He is going to eat K candies.
He wonders how many combinations he can select.
Can you answer his question for all K ($0 \le K \le N$)?
CRB is too hungry to check all of your answers one by one, so he only asks least common multiple(LCM) of all answers.

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case there is one line containing a single integer N.
$1 \le T \le 300$
$1 \le N \le 10^6$

Output

For each test case, output a single integer – LCM modulo 1000000007(10^9+7).

Sample Input

```
5
1
2
3
4
5
```

Sample Output

```
1
2
3
12
10
```

C. CRB and Farm

CRB has a farm. His farm has a shape of convex polygon. There are K barns in the farm. All of them are strictly inside the polygon. CRB wants to build a fence enclosing all the barns. He prepared $2K$ posts and steel strips of exactly the same length with the perimeter of his farm. A post can only be placed on the vertex of the polygon(farm), and steel strips must enclose all posts. Now, CRB wonders whether he can build a fence with currently available resources or not. Can you help him?

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains an integer N – the number of vertices of the convex polygon(the shape of CRB's farm).
Then N lines follow, i-th line containing two integers x and y, the coordinates of i-th vertex. The vertices are given in counter-clockwise order.
The first line contains an integer K – the number of barns.
Each of the next K lines contains two integers x and y, the coordinates of the barn.
$1 \le T \le 9$
$3 \le N, K \le 2 * 10^5$
$-10^9 \le x, y \le 10^9$
All points(including farm vertices and barns) are pairwise different.
It is guaranteed that the barns never all lie on a line.

Output

For each test case, output "Yes" if it is possible to build a fence, otherwise output "No".
If possible, output a solution in the following format:
On the first line, output an integer M - the number of posts used to build a fence.
On the next line, you should output the indices of the vertices(1-based) where you place posts in increasing order.
Your solution will be accepted if $M \le 2K$ and the length of the fence is not longer than the perimeter of the farm. Also, the barns must be strictly inside the fence.

Sample Input

```
1
5
0 1
3 0
4 2
2 3
0 3
3
2 1
3 1
3 2
```

Sample Output

```
Yes
4
1 2 3 4
```

D. CRB and Graph

A connected, undirected graph of N vertices and M edges is given to CRB.
A pair of vertices (u, v) ($u < v$) is called critical for edge e if and only if u and v become disconnected by removing e.
CRB's task is to find a critical pair for each of M edges. Help him!

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains two integers N, M denoting the number of vertices and the number of edges.
Each of the next M lines contains a pair of integers a and b, denoting an undirected edge between a and b.
$1 \le T \le 12$
$1 \le N, M \le 10^5$
$1 \le a, b \le N$
All given graphs are connected.
There are neither multiple edges nor self loops, i.e. the graph is simple.

Output

For each test case, output M lines, i-th of them should contain two integers u and v, denoting a critical pair (u, v) for the i-th edge in the input.
If no critical pair exists, output "0 0" for that edge.
If multiple critical pairs exist, output the pair with largest u. If still ambiguous, output the pair with smallest v.

Sample Input

```
2
3 2
3 1
2 3
3 3
1 2
2 3
3 1
```

Sample Output

```
1 2
2 3
0 0
0 0
0 0
```

E. CRB and His Birthday

Today is CRB's birthday. His mom decided to buy many presents for her lovely son.
She went to the nearest shop with M Won(currency unit).
At the shop, there are N kinds of presents.
It costs W_i Won to buy one present of i-th kind. (So it costs k × W_i Won to buy k of them.)
But as the counter of the shop is her friend, the counter will give $A_i \times x + B_i$ candies if she buys x(x>0) presents of i-th kind.
She wants to receive maximum candies. Your task is to help her.
1 ≤ T ≤ 20
1 ≤ M ≤ 2000
1 ≤ N ≤ 1000
0 ≤ A_i, B_i ≤ 2000
1 ≤ W_i ≤ 2000

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains two integers M and N.
Then N lines follow, i-th line contains three space separated integers W_i, A_i and B_i.

Output

For each test case, output the maximum candies she can gain.

Sample Input

```
1
100 2
10 2 1
20 1 1
```

Sample Output

```
21
```

F. CRB and Puzzle

CRB is now playing Jigsaw Puzzle.
There are N kinds of pieces with infinite supply.
He can assemble one piece to the right side of the previously assembled one.
For each kind of pieces, only restricted kinds can be assembled with.
How many different patterns he can assemble with at most M pieces? (Two patterns P and Q are considered different if their lengths are different or there exists an integer j such that j-th piece of P is different from corresponding piece of Q.)

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains two integers N, M denoting the number of kinds of pieces and the maximum number of moves.
Then N lines follow. i-th line is described as following format.
k a_1 a_2 $\ldots$ a_k
Here k is the number of kinds which can be assembled to the right of the i-th kind. Next k integers represent each of them.
1 ≤ T ≤ 20
1 ≤ N ≤ 50
1 ≤ M ≤ 10^5
0 ≤ k ≤ N
1 ≤ a_1 < a_2 < … < a_k ≤ N

Output

For each test case, output a single integer - number of different patterns modulo 2015.

Sample Input

```
1
3 2
1 2
1 3
0
```

Sample Output

```
6
```

G. CRB and Queries

There are N boys in CodeLand.
Boy i has his coding skill A_i.
CRB wants to know who has the suitable coding skill.
So you should treat the following two types of queries.
Query 1: 1 l v
The coding skill of Boy l has changed to v.
Query 2: 2 l r k
This is a report query which asks the k-th smallest value of coding skill between Boy l and Boy r(both inclusive).

Input

There are multiple test cases.
The first line contains a single integer N.
Next line contains N space separated integers A_1, A_2, …, A_N, where A_i denotes initial coding skill of Boy i.
Next line contains a single integer Q representing the number of queries.
Next Q lines contain queries which can be any of the two types.
1 ≤ N, Q ≤ 10^5
1 ≤ A_i, v ≤ 10^9
1 ≤ l ≤ r ≤ N
1 ≤ k ≤ $r - l$ + 1

Output

For each query of type 2, output a single integer corresponding to the answer in a single line.

Sample Input

```
5
1 2 3 4 5
3
2 2 4 2
1 3 6
2 2 4 2
```

Sample Output

```
3
4
```

H. CRB and Roads

There are N cities in Codeland.
The President of Codeland has a plan to construct one-way roads between them.
His plan is to construct M roads.
But CRB recognized that in this plan there are many redundant roads.
So he decided to report better plan without any redundant roads to President.
Help him!
The road (u, v) is redundant if and only if there exists a route from u to v without using it.

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains two integers N and M denoting the number of cities and the number of roads in the President's plan.
Then M lines follow, each containing two integers u and v representing a one-way road from u to v.
1 ≤ T ≤ 20
1 ≤ N ≤ 2 * 10^4
1 ≤ M ≤ 10^5
1 ≤ u, v ≤ N
The given graph is acyclic, and there are neither multiple edges nor self loops.

Output

For each test case, output total number of redundant roads.

Sample Input

```
1
5 7
1 2
1 3
1 4
1 5
2 4
2 5
3 4
```

Sample Output

```
2
```

I. CRB and String

CRB has two strings s and t.
In each step, CRB can select arbitrary character c of s and insert any character d ($d \neq c$) just after it.
CRB wants to convert s to t. But is it possible?

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case there are two strings s and t, one per line.

1 ≤ T ≤ 10^5

1 ≤ $|s|$ ≤ $|t|$ ≤ 10^5

All strings consist only of lowercase English letters.
The size of each input file will be less than 5MB.

Output

For each test case, output "Yes" if CRB can convert s to t, otherwise output "No".

Sample Input

```
4
a
b
cat
cats
do
do
apple
aapple
```

Sample Output

```
No
Yes
Yes
No
```

J. CRB and Substrings

Value of a string is defined as the number of distinct substrings of it.
For example, value of “ab” is 3(“a”, “b”, “ab”), and value of “xyx” is 5(“x”, “y”, “xy”, “yx”, “xyx”).
Now CRB has a string s.
For some integer k, CRB wants to know k-length substring of s which has maximum value. But it seems not so easy. Can you help him?

Input

There are multiple test cases.
The first line contains a string s. The next line contains an integer Q denoting the number of queries.
Each of the next Q lines contains a single integer k.
1 ≤ $|s|$ ≤ 10^5
s consists only of lowercase English letters.
1 ≤ Q ≤ 10
1 ≤ k ≤ $|s|$

Output

For each query k, output the string whose value is maximum among all k-length substrings of s, followed by its value.
If multiple substrings have same maximum value, output the lexicographically smallest one.

Sample Input

```
baa
2
2
1
```

Sample Output

```
ba 3
a 1
```

K. CRB and Tree

CRB has a tree, whose vertices are labeled by 1, 2, …, N. They are connected by N – 1 edges. Each edge has a weight.
For any two vertices u and v(possibly equal), $f(u, v)$ is xor(exclusive-or) sum of weights of all edges on the path from u to v.
CRB's task is for given s, to calculate the number of unordered pairs (u, v) such that $f(u, v) = s$. Can you help him?

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:
The first line contains an integer N denoting the number of vertices.
Each of the next N - 1 lines contains three space separated integers a, b and c denoting an edge between a and b, whose weight is c.
The next line contains an integer Q denoting the number of queries.
Each of the next Q lines contains a single integer s.
1 ≤ T ≤ 25
1 ≤ N ≤ 10^5
1 ≤ Q ≤ 10
1 ≤ a, b ≤ N
0 ≤ c, s ≤ 10^5
It is guaranteed that given edges form a tree.

Output

For each query, output one line containing the answer.

Sample Input

```
1
3
1 2 1
2 3 2
3
2
3
4
```

Sample Output

```
1
1
0
```