ACM-ICPC Asia-Amritapuri Site,

Problem set for 2nd Practice Round 2015

ACM14AM1

Mangalyaan-2

After the huge success of Mangalyaan this year, the ISRO (Indian Space Research Organization) is planning to launch a manned mission to Mars named Mangalyaan-2, in 2015. They obviously would want to select the best astronauts for this space mission. ISRO's research team has examined **N** available astronauts and computed a fitness score for each of them. It has been decided that astronauts with fitness score greater than or equal to a threshold score **P**, are eligible for the mission.

Can you report the number of eligible astronauts?

Input

The first line contains an integer **T** denoting the number of test cases.

Then for each test case, the first line contains two space separated integers **N** and **P** denoting number of astronauts and the threshold score respectively.

The second line of each test case contains N space-separated integers A_1, A_2, ..., A_N denoting the fitness scores of the astronauts.

Note: All fitness scores are distinct and are given in descending order.

Output

For each test case, output the number of astronauts eligible for the mission on a separate line.

Constraints

- **$1 \le T \le 100$**
- **$1 \le N \le 100$**
- **$1 \le P \le 1000$**
- **$1 \le A_i \le 1000$**

Example

Input:
3
3 10
7 3 1
3 5
7 3 1
3 1
7 3 1

Output:
0
1
3

Explanation

In the first case, no astronauts are selected as none of them have fitness score greater than or equal to 10.

In the second case, the astronaut with score 7 is selected.

In the third case, all astronauts are selected.

ACM14AM2

Ground Stations

ISRO has shot to global fame after Mangalyaan. They have decided to build hi-tech ground stations throughout the country which can be used either as a control station or as a launch station (but not as both simultaneously). A control station is one which has all controls to the rocket. A launch station is the site from where a rocket is launched. For a successful launch, ISRO has identified that they need 2 control stations and that these 2 control stations should be equidistant from the launch station.

Initially there is only one ground station having index **0**, where the headquarters of ISRO is located. Over a period of time, they plan to build more and more ground stations.

They can perform two kinds of operations (for given **V**):

- **Type 0**: Build a new ground station and construct a one-way road from the ground station having index **V** to the newly built ground station. In other words, if the index of the newly built ground station is **W**, then a one way road **V**->**W** having length = 1 is constructed. The index of the new ground station will be the smallest positive integer which is not the index of any existing ground station. (Of course, this also helps them to keep track of the number of ground stations they have built so far.)
- **Type 1**: Given a ground station with index **V**, count how many unordered pairs (**P**, **Q**) of ground stations exist such that the ground stations **P** and **Q** are both reachable from **V** (paths from **V** to **P** and **V** to **Q** exist), and there exists a ground station **R** (need not be reachable from **V**), such that distance(**P**, **R**) = distance(**Q**, **R**), **R** ≠ **P**, **R** ≠ **Q** and **P** ≠ **Q**. Of course, ISRO wants to know this information beforehand since such pairs (**P**, **Q**) are possible candidates for control stations, and **R** is a possible candidate for the launch station.

Adding more explanation

"Given a ground station with index V, count how many unordered pairs (P, Q) of ground stations exist such that the ground stations P and Q are both reachable from V (paths from V to P and V to Q exist), and there exists a ground station R (need not be reachable from V), such that distance (P,R) = distance(Q, R), R ≠ P, R ≠ Q and P ≠ Q."

As this says, there need not be path from R->P or P->R. However please use the following as definition of distance.

Distance(X, Y) = Number of roads in the unique path from X to Y, if the given road network were bi-directional.

Please note that, V->P and V->Q should still exist in directed road network.

Input

The first line of the input contains an integer **T** denoting the number of test cases. The description of **T** test cases follows.

The first line of each test case contains a single integer **M** denoting the number of operations.

Each of the next **M** lines contain 2 integers - **type** and **V**.

if **type** = 0, then perform type 0 operation (for given **V**).

if **type** = 1, then perform type 1 operation (for given **V**).

Output

For each test case, for each query of **type** 1, you must print the answer to the query on a separate line.

Constraints

- **1 ≤ T ≤ 5**
- **1 ≤ M ≤ 100000**
- **0 ≤ type ≤ 1**
- For both type of operations 0 & 1, the given ground station **V** would have already been built.

Example

Input:

```
2
4
1 0
0 0
0 1
1 0
6
0 0
0 1
1 0
0 1
0 2
1 1
```

Output:

```
0
1
1
2
```

Explanation

Example case 1:

First operation is of **type** 1. There is only 1 ground station (with index 0), so number of pairs are 0.

Second operation is of **type** 0. A new ground station with index 1 is built, and a road from **0->1** (having length 1) is added.

Third operation is of **type** 0 again. A new ground station with index 2 is built, and a road from **1->2** (having length 1) is added.

Fourth operation is of **type** 1. There are 3 ground stations now. (0, 2) is the only valid pair as there exists ground station 1 with distance(2, 1) = distance(0, 1) = 1, and both the stations 0 & 2 are reachable from 0.

Example case 2:

There are 2 operations of **type** 1. For the first one, (0, 2) is the only valid pair, and for the second one, there are 2 valid pairs pairs - (2, 3) and (1, 4).

ACM14AM3

Launch Tower

"The Mars Orbiter Mission probe lifted-off from the First Launch Pad at Satish Dhawan Space Centre (Sriharikota Range SHAR), Andhra Pradesh, using a Polar Satellite Launch Vehicle (PSLV) rocket C25 at 09:08 UTC (14:38 IST) on 5 November 2013".

The secret behind this successful launch was the launch pad that ISRO used. An important part of the launch pad is the launch tower. It is the long vertical structure which supports the rocket.

ISRO now wants to build a better launch pad for their next mission. For this, ISRO has acquired a long steel bar, and the launch tower can be made by cutting a segment from the bar. As part of saving the cost, the bar they have acquired is not homogeneous.
The bar is made up of several blocks, where the i^{th} block has durability **S[i]**, which is a number between **0** and **9**. A segment is defined as any contiguous group of one or more blocks.

If they cut out a segment of the bar from i^{th} block to j^{th} block (i<=j), then the durability of the resultant segment is given by $(S[i]*10^{(j-i)} + S[i+1]*10^{(j-i-1)} + S[i+2]*10^{(j-i-2)} + ... + S[j] * 10^{(0)}) \% M$.

In other words, if $W_{(i,j)}$ is the base-10 number formed by concatenating the digits **S[i], S[i+1], S[i+2], ... , S[j]**, then the durability of the segment (i,j) is $W_{(i,j)} \% M$.

For technical reasons that ISRO will not disclose, the durability of the segment used for building the launch tower should be exactly **L**. Given **S** and **M**, find the number of ways ISRO can cut out a segment from the steel bar whose durability is **L**.

Input

The first line contains a string **S.** The i^{th} character of this string represents the durability of i^{th} segment.

The next line contains a single integer **Q**, denoting the number of queries.

Each of the next **Q** lines contain two space separated integers, denoting **M** and **L.**

Output

For each query, output the number of ways of cutting the bar on a separate line.

Constraints

- **1 ≤ |S| ≤ 2 * 10^4**
- **Q ≤ 5**
- **0 < M < 500**
- **0 ≤ L < M**

Example

Input:
```
23128765
3
7 2
9 3
15 5
```

Output:
```
9
4
5
```

Explanation

For M=9, L=3, the substrings whose remainder is 3 when divided by 9 are: 3, 31287, 12 and 876.

ACM14AM4

Landing Platform

ISRO is planning to build a landing platform on MARS as a part of MOM. It has selected a small 2-D rectangular region for the same, and every point in the region has a strength associated with it. The landing platform should be in the form of a cross (see definition below for more details) and as strong as possible.

The selected 2-D rectangular region has **M** * **N** points represented by (x, y), for all **0** <= x < **M**, **0** <= y < **N**. Let **W[i][j]** denote the strength of the point (i, j). We define a cross as follows:

- It consists of 2 line segments of equal length. The end points of the line segments should coincide with any of the given **M** * **N** points.
- Each of the line segments are at an angle of 45Â° with both the **X** & **Y** axis.
- Both the line segments intersect exactly at one point, and their centres coincide. (i.e) if the 2 line segments are represented by { (x_{11}, y_{11}), (x_{12}, y_{12}) }, { (x_{21}, y_{21}), (x_{22}, y_{22}) }, then $(x_{11}+x_{12}) / 2 = (x_{21}+x_{22}) / 2$ and $(y_{11}+y_{12}) / 2 = (y_{21}+y_{22}) / 2$. The point where the 2 line segments intersect is called the center of the cross.
- Each line segment of the cross should have a non-zero length. Hence, a single point cannot be considered as a cross.

The strength of a cross is defined as the sum of strengths of all points that lie on it. Your task is to find the cross with maximum strength, which ISRO would like to use as the landing platform.

Input

The first line contains an integer **T**, denoting the number of test cases.

Then for each test case, the first line contains two integers **M** and **N**.

Each of the following **M** lines, contain **N** space separated integers, where the j^{th} integer on the i^{th} line denotes **W[i-1][j-1]**, for all **1** <= i <= **M**, **1** <= j <= **N**.

Output

For each test case, output a single integer denoting the strength of the maximum-strength cross, on a separate line

Constraints

- **$T \leq 100$**
- **$2 \leq M \leq 100$**
- **$2 \leq N \leq 100$**
- **$-10^6 \leq W[i][j] \leq 10^6$**

Example

Input:

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

Output:

```
-1
6
```

Explanation

In the first case, the cross formed by the line segments {(0, 0), (2, 2)} and {(0, 2), (2, 0)} has the maximum strength = 1+(-1)+1+(-1)+(-1) = -1. **Note**: You cannot choose a cross with 0 strength (not passing through any of the given points) here, because it is given that each line segment of the cross should pass through atleast one of the given points

In the second case, the cross formed by the line segments {(0, 0), (1, 1)} and {(0, 1), (1, 0)} has the maximum strength = 0+3+1+2 = 6

ACM14AM5

Supercomputer

The ISRO (Indian Space Research Organization) has recently built a supercomputer with the help of C-DAC (Center for Development of Advanced Computing), for processing data generated from MOM (Mars Orbiter Mission). Before using it for real data, they want to test it out with the following problem, as they feel it is very hard for a normal computer to solve this problem.

Given a number **N**, find the sum of **f(x)** for all x such that **1** <= x <= **N**.
f(x) is defined as the sum of all digits in base 10 representation of the number **x**.

For example, **f(121)** = 1 + 2 + 1 = 4.

As the number **N** is very big, it is given in the following run length encoded format - **N** is represented as a sequence of **M** blocks, where each block i (**0** <= i < **M**) is represented by two integers - (**len[i]**, **d[i]**). This implies that the digit **d[i]** occurs **len[i]** number of times.

For example, {(2,1), (1,2), (2,9)} represents the number 11299.

Can you help them by writing a solution to validate the supercomputer's output?

Note: There will be no leading zeros in the given number.

Input

The first line contains a single integer **T**, denoting the number of test cases.

For each test case, the first line contains an integer **M**.

Each of the following **M** lines contain 2 space separated integers, where the i^{th} line describes the i^{th} block with length **len[i]** and digit **d[i]** respectively.

Output

For each test case, print the result modulo **1000000007** on a separate line.

Constraints

- **1** ≤ **T** ≤ **25**
- **1** ≤ **M** ≤ **10000**
- **d[0]** > **0**
- **0** ≤ **d[i]** ≤ **9**
- **1** ≤ **len[i]** ≤ $\mathbf{10^{18}}$
- **1** ≤ Total length of **N** ≤ $\mathbf{10^{18}}$

Example

Input:
2
1
1 5
2
1 1
1 0

Output:
15
46

Explanation

For case 1, the N is 5 and the result is 1 + 2 + 3 + 4 + 5 = 15.

For case 2, the N is 10 and the result is 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + (1 + 0) = 46.