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## Greetings From Globussoft

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- ❖ Given below are 5 Programming questions, you have to solve any 3 out of 5 questions.
- ❖ These 5 questions you can attempt in any technology like C/C++, java, .Net, PHP
- ❖ To solve these 3 questions you've max. 3 hours.
- ❖ While Solving these questions you are not allowed to use any Search Engine like Google, Yahoo, Bing ...

All the best for your test

Globussoft

## QUESTION - 1

As many books, movies and video games had shown us, a zombie outbreak was inevitable. However, all hope is not lost. As usual you've encountered a young girl that has been bitten but not transformed. Therefore, you've escorted her to a medial facility so her blood can be studied and a cure manufactured.

Unfortunately, the medical facility, for obvious reasons, has not been resupplied in a while. The scientists there have asked you to pick several tools, viruses and whatnots, from  $N$  places in the city.

Now that you have to go out again, you have created a map with the  $N + 1$  locations: the medical facility (location 0) and the other  $N$  where the scientists need you to pick something up (numbered from 1 to  $N$ ). You've also came up with  $M$  two-way paths between some of the locations and the probability to

encounter a zombie pack on each of those paths. Note that this is isn't science fiction. If you encounter a zombie pack, you will not survive.

You certainly want to fetch all the items and come back alive. You want to compute the maximal probability of picking every item and coming back to the medical facility (safe and sound) if you take a closed walk (cycle that allows node repetitions).

## Input

The input contains several test cases. Each test case begins with two integers, the number of places you have to go to ( $1 \leq N \leq 16$ ) and the number of paths you came up with ( $1 \leq M \leq N^2$ ), separated by a single space.

The next  $M$  lines contain 2 integers and a real number separated by spaces. Two integers  $u_i$  and  $v_i$  ( $0 \leq u_i, v_i \leq N$  and  $u_i \neq v_i$ ) are the locations this path connects. Real number  $p_i$  ( $0 \leq p_i \leq 1$ ) represents the probability that you will encounter a zombie pack along this path.

You may assume that, for all  $i \neq j$ , probabilities  $p_i$  and  $p_j$  are independent from each other.

The end of input is indicated by a test case with  $N = M = 0$  and should not be processed

## Output

For each test case output a single line with a single real number: the probability of getting back to the medical facility alive with all items. Round the result to exactly three places after decimal point. If there's no way to pick all items, you should output 0.000.

## Example

### Input :

```
2 3
0 1 0.3
0 2 0.4
1 2 0.2
2 3
0 1 0.3
0 2 0.5
1 2 0.1
2 2
0 1 0.1
0 1 0.9
2 3
```

```
0 1 0.92
0 2 0.92
1 2 0.92
2 3
0 1 0.92
0 2 0.92
1 2 0.93
0 0
```

**Output:**

```
0.336
0.397
0.000
0.001
0.000
```

## QUESTION – 2

A maritime accident has caused oil to spill onto the seas of Felipistonia, which is a major natural disaster. The Felipistonia's government wants to clean up this mess before more damage occurs. To do this, they fi

rst have to know how serious was the accident and the amount of oil that has been spilled into the sea. The only instrument the Felipistonia's government has to get information of the magnitude of this disaster, is the use of satellite images. With these images they can estimate how much money they have to spend to clean this mess. For this, the number of slicks in the seas and the size of each slick must be know. A slick is a patch of oil floating on water. Unfortunately, the Felipistonia's people are not very bright, so they have hired you to help them process the image.

An example of an image obtained by the satellites is shown in Figure 1(a). This image can be transformed to 0's and 1's as seen in Figure 1(b). Given this binary matrix, your job is to count the number of slicks in the ocean and their corresponding size. Two adjacent pixels in the image are considered to be in the same slick if they are in the same row or the same column.

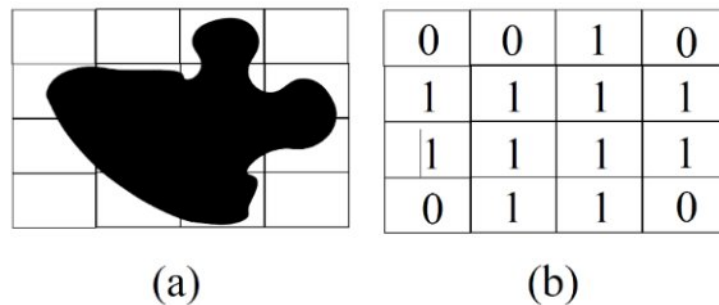


Figure 1: (a) A satellite image of the spilled oil. (b) The representation of the image in a binary matrix

## Input

The input contains several test cases, each one corresponding to a different satellite image. The first line of each case contains two integers that indicate the number of rows (N) and columns (M) in the image ( $1 \leq N, M \leq 250$ ). Then N lines follows with M integers each, containing the information of the image.

The end of input is indicated by a test case with  $N = M = 0$ . This case should not be processed.

## Output

For each image, output the number of slicks in the sea. Additionally, output the size of each slick in ascending order and the number of slicks of that size.

## Example

**Input :**

```

10 10
1 1 1 1 1 1 1 1 1 1
1 1 1 1 0 0 0 0 0 0
1 1 1 0 0 0 0 1 1 1
1 1 0 0 1 0 0 1 1 1
1 0 1 0 0 1 1 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1 1 1
0 0

```

**Output :**

```

7
1 2
2 1
6 1
10 2
20 1

```

## QUESTION – 3

You would have been fed up with competitive programming questions so far ,now it is time to solve little math .

Assume u have a equation  $A * x - B * y = 0$

For a given value of A and B , find the minimum positive integer value of x and y that satisfies this equation.

Input :

first line contains T ,number of test cases  $0 \leq T \leq 1000$   
followed by T lines

firstline of each test case contains two space seperated integers A and B.  $1 \leq A, B \leq 1000000000$

Ouput :

For each test case output a single line containing two integers x and y (seperated by a single space ) .Print new line after each test case.

Example :

Input :

1

2 3

Output :

3 2

Note: Brute force wont pass the given constraint.

Negative number cases is avoided to make the problem easy.

## QUESTION – 4

Byteasar has discovered a cave. It appears that the cave contains  $n$  chambers connected with passages in such a way that there exists a single way of getting from any chamber to any other chamber.

The cave should now be examined more thoroughly, so Byteasar has asked his friends for help. They have all arrived at the cave and they are willing to divide themselves into groups. Each group should examine the same number of chambers, and each chamber should be examined by exactly one group. Additionally, for the groups not to interfere with each others' work, the members of each group should be able to move between the assigned chambers without passing through chambers assigned to other groups.

How many groups can the explorers be divided into?

### Input

The first line of the input contains one integer  $n$  ( $2 \leq n \leq 3000000$ ) denoting the number of chambers in the cave. The chambers are numbered 1 through  $n$ .

The following  $n - 1$  lines describe connections between the chambers. The  $i$ -th of these lines contains an integer  $a_i$  ( $1 \leq a_i \leq i$ ) which represents a passage connecting chambers number  $i + 1$  and  $a_i$ .

### Output

Your program should output a single line containing all integers  $k$ , such that the chambers can be divided into  $k$  disjoint sets of equal size, and one can move between any two chambers belonging to the same set passing only through chambers from this set. The numbers should be written in an ascending order and separated with single spaces.

### Example

Input :

6  
1  
2  
3  
3  
5

**Output :**

1 3 6

## QUESTION – 5

A website provides its users with a variety of services. There are a total of **K** services available on that website. At present there are **M** users/clients registered to the website.

Now each client of this service provider firm is to be allocated a project by the website which makes use of a string **A1,A2,A3.....An** of **N** services all of which the website is providing. The order in which the services are executed **matters** (compiling and then linking is different from linking and then compiling). Also, in a particular project, the same services cannot be executed twice in succession. For example, compiling → linking → compiling is allowed, but linking → linking → compiling is not allowed because 'linking' comes twice in succession.

All the **M** clients will start working at the same time and the time taken for the execution of all services is equal. At a time, one service can be accessed by only one client as there is only one server. For eg. If there are 3 clients with projects – **A1,A2...An** ; **B1,B2....Bn** and **C1,C2....Cn** , then **Ai, Bi, Ci** are pairwise distinct for  $1 \leq i \leq N$ . You need to find in how many ways in which the **M** clients can be allocated their projects.

### Input

First line containing **T** (number of test cases).

For each test case one line containing 3 integers **N** ,**M** and **K**.

### Output

For each test case output a separate line containing the answer modulo 1000000007.

### Constraints

$1 \leq T \leq 10$

$0 \leq N \leq 1000000000$



$1 \leq \mathbf{M} \leq 100$

$0 \leq \mathbf{K} \leq 1000$

**Sample Input**

3

2 2 3

1 2 3

2 3 4

**Sample Output**

18

6

264