Greetings From Globussoft

- 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

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QUESTION - 1

Finding the treasures hidden centuries ago by the pirates of the Caribbean islands is no easy task, but even more difficult is living to tell the story. This is because, as everybody knows, pirates had supernatural powers which they used to curse the person who took their treasure unauthorized.

A very common curse among the most powerful of pirates, and for which it is always a good idea to be prepared, is known today as the *deadly mist*. Whenever a pirate's treasure is found, this curse will make a poisonous mist lift from the ground until the whole island gets covered by it. Any living creature that is touched by the mist will die instantly, something especially undesirable for those who have just found a treasure. The only way to save yourself is then to return to your boat, always going through areas that have not yet been covered by the mist, and thus flee with that part of the treasure that may have been rescued. In this problem we are interested in knowing what's the maximum amount of time that one can take to collect the treasure in such a way so as to be able to return to the boat alive.

To simplify the problem, we will consider that an island can be represented by a grid with **R** rows and **C** columns, in which the cell in the **i**-th row and the **j**-th column has height $\mathbf{H_{ij}}$ above sea level. Furthermore, we will assume that the treasure is always hidden in the cell in row **1** and column **1**, because this is the one furthest away from the only place where the boat can set anchor, which is the cell in row **R** and column **C**. The deadly mist appears at sea level at the very same instant that the treasure is found, and then rises on all the island at a rate of one unit of height per second, so that after **t** seconds one cannot be in any cell of height less or equal to **t**. In order to return to the boat, you may go from one cell to another only if they share a side, so that if you are on a given cell you can only move horizontally to the cell before or after it in the same row, or vertically to the cell before or after it in the same column, but you cannot move diagonally or cross the boundaries of the island. Each such movement from one cell to another takes exactly one second.

Input

The first line contains two integer numbers **R** and **C**, respectively the number of rows and columns of the grid that represents the island, which consists of at least two cells ($\mathbf{1 \leq R, C \leq 500}$ and $\mathbf{R \times C \geq 2}$). Each of the following **R** lines contains **C** values. In the **i**-th of these **R** lines, the **j**-th value is an integer $\mathbf{H_{ij}}$ representing the height of the cell at row **i** and column **j** ($\mathbf{1 \leq H_{ij} \leq 10^6}$ for **i = 1, ..., R** and **j = 1, ..., C**).

Output

Print a single line containing an integer number representing the maximum amount of time in seconds that one can take to collect the treasure, so as to be able to return to the boat without

being reached by the deadly mist. Print the number **-1** if it is impossible to return to the boat even if one starts the way back as soon as the treasure is discovered.

Example 1

Input:
```
3 3
3 3
2 3 4
3 4 5
4 5 6
```
Output:
```
1
```

Example 2

Input:
```
3 3
1 2 3
2 2 3
2 4 5
```

Output:
```
-1
```

Example 3

Input:
```
3 2
1000000 1000000
1000000 1000000
1000000 314
```

Output:
```
310
```

QUESTION – 2

Farmer John has been taking an evening algorithms course at his local university, and he has just learned about minimum spanning trees. However, Farmer John now realizes that the design of his farm is not as efficient as it could be, and he wants to simplify the layout of his farm. The farm is currently arranged like a graph, with vertices representing fields and edges representing pathways between these fields, each having an associated length. Farmer John notes that for each distinct length, at most three pathways on his farm share this length. FJ would like to remove some of the pathways on his farm so that it becomes a tree -- that is, so that there is one unique route between any pair of fields. Moreover,

Farmer John would like this to be a minimum spanning tree -- a tree having the smallest possible sum of edge lengths. Help Farmer John compute not only the sum of edge lengths in a minimum spanning tree derived from his farm graph, but also the number of different possible minimum spanning trees he can create.

Input

* Line 1: Two integers N and M (1 <= N <= 40,000; 1 <= M <= 100,000), representing the number of vertices and edges in the farm graph, respectively. Vertices are numbered as 1..N. * Lines 2..M+1: Three integers a_i, b_i and n_i (1 <= a_i, b_i <= N; 1 <= n_i <= 1,000,000) representing an edge from vertex a_i to b_i with length n_i. No edge length n_i will occur more than three times.

Output

* Line 1: Two integers representing the length of the minimal spanning tree and the number of minimal spanning trees (mod 1,000,000,007).

Example

Input:
```
4 5
1 2 1
3 4 1
1 3 2
1 4 2
2 3 2
```
Output:
```
4 3
```

QUESTION – 3

Naruto was always alone as a kid. He used to get bored a lot and always tried different things for fun. Once he got facinated by isosceles triangles and developed a game. He will choose a integer value S to be length of the equal sides of the isosceles triangle. Now if it is possible that he can form any triangle which has a third side of even length as well a height of integral value with the third side as base then he becomes happy.
Given S determine if Naruto will be happy.

Input

First line contains T, the number of test cases. (T<=10000)

The next T lines each contain a integer value S<1000000.

Output

For each of T test cases output YES if Naruto will be happy and NO otherwise

Example

```
Input:
2
5
8
Output:
YES
NO
```

QUESTION – 4

Marina is a college girl who likes to play with all kinds of numbers. One day she was very bored and decided to play around with even numbers.

She writes N numbers on the board (odd and even numbers) and then, she modifies only even numbers (for some reason she likes the odd numbers) and inverts its binary representation (from the left to the right) and replaces each even number. But soon she gets bored and ask you help in order to automate the conversion process.

Input

In the first line contains the value of N. This integer is followed by N lines, every one with a positive integer a_i ($1 <= a_i <= 10^7$)

Output

The output will contain N lines, the numbers that are on the blackboard after the conversion process

Example

```
Input:
5
10
8
3
5
2

Output:
5
1
```

```
3
5
1
```

QUESTION – 5

Kapish is a huge fan of football. He loves anything and everything related to the game and never misses a single match when his favourite team, Manchester United, is playing. Being the coder that he is, one day he decides to create his own, slightly modified version of football, through code.

The game is played between 2 teams having **M players** each and continues for **N minutes**. In each minute of the game, **exactly one** of the following 5 events will take place:

1. Team 1 scores a goal
2. Team 2 scores a goal
3. A player from team 1 gets a red card
4. A player from team 2 gets a red card
5. None of the above

A player who gets a red card can take no further part in the game. If at any point of time, a team is left with less than 5 players on the field, it will automatically get disqualified, and the other team will be declared as the winner.

Kapish is very pleased with his new game. However, Pushap, who hates boring draws in football, is not impressed. “Do you even know how many ways are there for this game to end in a draw?” he asks.

Given N and M, can you help Kapish find out the number of ways for the game to end in a draw? (draw means both teams end up with the same number of goals at the end of N minutes) Since the number of ways can be very large, you need to print the answer mod 1000000007.

Note 1: Two ways are considered different, if the event(s) of at least 1 minute are different in them.

Note 2: For the sake of simplicity, you can assume that all the players in a team are identical.

Input

First line contains T, the number of test cases.

Each test case consists of a single line, with 2 space separated integers, N and M.

Output

For each test case, output a single line, containing the number of ways mod 1000000007.

Example

Input:
```
2
1 11
2 8
```
Output:
```
3
11
```