1337 Global Round 2

A1. Is it that easy

1 s., 256 MB

Mahmoud and Ehab have discovered a magic button. When one of them click this button, the number increases by 1. The initial value of the number is 0. Rhiba decides to challenge them by giving them a random number. Ehab and Mahmoud take turns clicking the button once in an attempt to reach the given number. They alternate, with Ehab clicking first, and then Mahmoud, and so on, until one of them make the final click to reach the target and win. Write a program to determine the winner of the contest based on the given conditions.

Input
The first line contains an integer, n $(1 \leq n \leq 10^9)$,the number given by Rhiba.

Output
If Ehab wins, print "Ehab". If Mahmoud wins, print "Mahmoud".

input
1
output
Ehab

input
2
output
Mahmoud

A2. Welcome new soldiers

1 s., 256 MB

The CP Club is excited about its new promo! To make things interesting.The president Mahmoud wants to organize a contest and divide the participants into four divisions based on their ranks.

- Division 1: $1900 \leq \text{rank}$
- Division 2: $1600 \leq \text{rank} \leq 1899$
- Division 3: $1400 \leq \text{rank} \leq 1599$
- Division 4: $\text{rank} \leq 1399$

Your job is to create a program that takes a participant's rank as input and puts them into one of four groups: Division 1, Division 2, Division 3, or Division 4.

Input
The first line of the input contains an integer t $(1 \leq t \leq 10^5)$ — the number of testcases.

The second contains participant rank $(-5000 \leq \text{rank} \leq 5000)$.

Output
For each test case, output a line containing the correct division in the format "`Division X`", where X is the divition of the participant

input
7 -789 1299 1300 1399 1400 1679 2300
output
Division 4 Division 4 Division 4 Division 4 Division 3 Division 2 Division 1

For test cases $1 - 4$, the corresponding ranks are -789, 1299, 1300, 1399, so all of them are in division 4.

For the fifth test case, the corresponding rank is 1400, so it is in division 3.

For the sixth test case, the corresponding rank is 1679, so it is in division 2.

For the seventh test case, the corresponding rank is 2300, so it is in division 1.

B. Said && Cakes

1 s., 256 MB

Jalal is a generous contributor to the CP (Competitive Programming) club. He brought 'n' boxes for the club, and gave them to Smazouz, each box contains a different number of cakes. Smazouz, being a bit superstitious about his luck, wants to distribute the cakes equally among all the club members.

To achieve this, Smazouz comes up with an idea - he decides to eat a certain number of cakes from each box until all the boxes have the same quantity of cakes. Smazouz wants to minimize the total number of cakes he has to eat.

Write a program to determine the minimum total number of cakes Smazouz has to consume to equalize the number of cakes in all the boxes.

Input
The first line contains an integer t $(1 \leq t \leq 1000)$ — the number of test cases.

The first line of each test case contains an integer 'n' (1 ≤ n ≤ 100) - the number of boxes.

The second line contains 'n' space-separated integers a_1, a_2, ..., a_n $(1 \leq a_i \leq 10^7)$ – the number of cakes in each box.

Output
For each test case, Output a single integer - the minimum total number of cakes Smazouz has to eat.

input

```
5
5
1 2 3 4 5
6
1000 1000 5 1000 1000 1000
10
1 2 3 5 1 2 7 9 13 5
3
8 8 8
1
10000000
```

output

```
10
4975
38
0
0
```

For the first test case, you can eat 1 cake from the second box, 2 cakes from the third box, 3 cakes from the fourth box and 4 cakes from the fifth box. Now the boxes have $[1, 1, 1, 1, 1]$ cakes in them and you ate $0 + 1 + 2 + 3 + 4 = 10$ cakes in total so the answer is 10.

For the second test case, the best answer is obtained by making all boxes contain 5 cakes in them, thus eating $995 + 995 + 0 + 995 + 995 + 995 = 4975$ cakes in total.

C. Magical land

1 s., 256 MB

Once upon a time, there was a grid with rows and columns. Some spots were empty, marked with a dot ('.'). There were also stones marked with '*', and obstacles marked with the letter 'o'.

Something interesting happened in this magical land. The stones wanted to go down as far as they could. So, they started falling, like little adventurers exploring the grid. They would keep falling until they reached the bottom, an obstacle, or another stone that had already stopped.

Imagine this like a dance of falling stones and obstacles. As they moved, they changed the grid, creating a new pattern. It's like a magical performance, leaving behind a transformed grid with stones and obstacles in a unique arrangement. This was the enchanting story of how the grid changed as the stones gracefully descended.

Input

The input consists of multiple test cases. The first line contains an integer t ($1 \le t \le 200$) — the number of test cases

The first line of each test case contains two integers n and m ($1 \le n, m \le 100$) — the number of rows and the number of columns in the grid

The following lines describe the initial configuration of the grid, where '.' represents an empty cell, '*' represents a stone, and 'o' represents an obstacle.

Output

For each test case, output a grid with n rows and m columns, showing the result of the process.

input

```
3
6 10
.*.*....*.
.*.......*
...o....o.
.*.*....*.
..........
.o......o*
2 9
...***ooo
.*o.*o.*o
5 5
*****
*....
*****
....*
*****
```

output

```
..........
...*....*.
.*.o....o.
.*........
.*......**
.o.*....o*

....**ooo
.*o**o.*o

.....
*...*
*****
*****
*****
```

D. 9lai9el Birthday

1 s., 256 MB

"9lai9el" is celebrating his birthday, and his friend has gifted him a bag a of ping pong balls. Each ball is labeled with a number from 1 to n. Now, "9lai9el" is curious to know if there are at least three balls with the same number.

Write a program to help "9lai9el" determine whether his bag of ping pong balls contains exactly three balls with the same number. If such a set of three balls exists, the program should output the number on the balls; otherwise, it should output "-1".

Input

The first line contains an integer t ($1 \le t \le 10^4$) — the number of test cases.

The first line of each test case contains an integer n ($1 \le n \le 2 \cdot 10^5$) — the number of the balls in the bag

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) — the number write on the ball

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

Output the number on the three balls if there are exactly three balls with the same number; otherwise, output "-1".

input

```
7
1
1
3
2 2 2
7
2 2 3 3 4 2 2
8
1 4 3 4 3 2 4 1
9
1 1 1 2 2 2 3 3 3
5
1 5 2 4 3
4
4 4 4 4
```

output

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

E. (al3achra) in the MNPC

1 s., 256 MB

The 1337 Club is excited to participate in the Moroccan National Programming Contest (MNPC). The club has a total of n participants, divided into m teams in some way. Each team must have at least one participant. After the competition, each pair of participants from the same team becomes friends.

Write a program to find the minimum and maximum number of pairs of friends that could have formed by the end of the competition.

Input

The only line of input contains two integers n and m, separated by a single space ($1 \leqslant m \leqslant n \leqslant 10^9$) — the number of participants and the number of teams

Output

Print two space-separated integers on a single line: the minimum and maximum number of pairs of friends that could have been formed.

input

```
5 1
```

output

```
10 10
```

input

```
3 2
```

output

```
1 1
```

input

```
6 3
```

output

```
3 6
```

Note

In the first sample all the participants get into one team, so there will be exactly ten pairs of friends.

In the second sample at any possible arrangement one team will always have two participants and the other team will always have one participant. Thus, the number of pairs of friends will always be equal to one.

In the third sample minimum number of newly formed friendships can be achieved if participants were split on teams consisting of 2 people, maximum number can be achieved if participants were split on teams of 1, 1 and 4 people.

F. 9arafi dinner

1.5 s., 256 MB

binisba a - b raha range chofe Note alata7t la3ala wa3asa tafham (bnadam bakay)

9arafi loves indulging in candies for dinner. His dinner can be represented as a sequence of several candies, some of them black and some of them white. However, 9arafi has a specific rule for a delightful dinner: he wants to eat white candies only in groups of size k.

Now, 9arafi wonders in how many ways he can enjoy between a and b candies. As the number of ways could be very large, print it modulo 1000000007 (10^9 + 7).

Input

Input contains multiple test cases.

The first line contains two integers t and k ($1 \leq t, k \leq 10^5$), where t is the number of test cases.

The next t lines contain two integers a_i and b_i ($1 \leq a_i \leq b_i \leq 10^5$), describing the i-th test.

Output

Print {t} lines to the standard output. The i-th line should contain the number of ways in which 9arafi can enjoy between ai and bi candies at dinner, modulo 1000000007 (10^9 + 7).

input

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

output

```
6
5
5
```

- For $K = 2$ and length 1 9arafi can eat (B).
- For $K = 2$ and length 2 9arafi can eat (BB) and (WW).
- For $K = 2$ and length 3 9arafi can eat (BBB), (BWW) and (WWB).
- For $K = 2$ and length 4 9arafi can eat, for example, ($WWWW$) or ($BWWB$), but for example he can't eat ($WWWB$).