CodeWars - Finals

Rules:

- An intentionally obfuscated code will be disqualified.
- If you are found reusing any code written before contest, you will be disqualified immediately.
- If you are challenging a team on the basis of execution time, then either provide a test case where the difference is easily noticeable or explain your challenge with a logical reason.
- If you are challenging a team for wrong answer, then you HAVE to provide a supporting test case.
- If your challenge is valid then you will be credited with 20% of the respective problem's points, but if your challenge is invalid then your points will deducted by 10% of that problem's points.
- If your solution is correctly challenged by any other team for wrong answer then you won't get any points for that question.
- Please note that, a solution should produce output within 5 seconds for any test case, other wise it will be treated as a wrong answer if it is challenged.
- Source Code Limit: 50000 bytes

HIRE 'EM!

Problem Code: A   Points: 100

ACM NIT- Surat is hiring programmers for a big project. Due to budget limit, we can hire maximum n programmers. There are x C++ programmers and y Java programmers available. Assuming that there is no difference between any two C++ programmers or any two Java programmers, find the number of ways in which n or less than n programmers can be hired.

Input:

The first and only line of the input contains three integers, n, x and y separated by a single space.

Output:

Output a single line containing the number of ways hiring can be done.

Constraints:

$1<=n<=10^6$

$n<=x,y<=2*n$

Sample Input:

2 10 10

Sample Output:

6

Explanation:

The ways in which 2 or less coders can be hired are:

(Number of C++ programmers , Number of Java programmers)

 (0,0)

 (0,1)

 (1,0)

 (1,1)

 (2,0)

 (0,2)

DEVU AND TAZOS:

Problem Code: B   Points: 200

Devu is a new student in his school. On the first day of his school he realized that most of the students belong to different groups.
Every student has some tazos. Strength of a group is the sum of tazos of every member. Devu wants to join only those groups that will have a prime strength after his joining. He currently has P tazos.
There are total N students (excluding Devu) in the school. Every student has his unique roll number between 1 to N.
Devu knows about some pairs of students in which both students belong to the same group. For example if {X,Y} pair is given, it means that roll number X and roll number Y are in the same group. You are given M such pairs. Assuming that there is enough information to determine every group, you have to find out how many different groups he can join.

NOTE: If a student's roll number does not come in any pair. It means he is not in any group and he has his own group in which he is the only member.

Input:
Input begins with T, the total number of test cases. Each test case begins with 3 space separated integers N (Number of students excluding Devu), M (Number of pairs) and P(number of tazos Devu has).
The next N lines contain the integer Ti, Number of tazos the ith student has.
The next M lines contain the pairs {X,Y}, which means X and Y are in the same group.

Output:
Output a single line for each test case containing an integer value which is the number of different groups Devu can join.

Constraints:
1<=N<=10000
1<M<=N*(N-1)/2
1<=X,Y<=N
1<=P<=1000

Total Tazos in the school would be less than 10^6.

Sample Input 1:
1
6 3 2
4
5
2
4
9

4
1 2
1 3
4 5

1

Explanation:
There are 3 groups {1,2,3} , {4,5} and {6}.
Strength of group {1,2,3} is 4+5+2=11 and after adding Devu's Tazo total strength will be 11+2=13(prime).
Strength of group {4,5} is 4+9=13 and total after adding Devu's Tazo total strength will be 13+2=15(not a prime).
Strength of group {6} is 4 and after adding Devu's Tazo total strength will be 4+2=6(not a prime).

Hence, he can join only group {1,2,3}.

Highways:

Problem Code: C   Points: 200

These days in Byteland, rumors are that the highway minister is corrupt. He is building useless highways just to fill his pocket. The ACBB (Anti Corruption Bureau of Byteland) is seeking your help regarding this matter.

The different cities of Byteland are numbered as 1,2,...N (total N cities). You are given pairs {X,Y}, which means that cities X and Y are directly connected by a highway. If there exist a path between 2 cities P and Q via any other city then P and Q are connected indirectly. So, creating a new direct highway from P to Q is useless. All the highways are bi-directional.
You have to find whether the minister is corrupt or not. i.e. whether there exist useless highways or not.

All pairs of the cities are connected directly or indirectly via some highway irrespective of the minister being corrupt or not.

Input:
In the first line number N and M are given. N is number of cities and M is number of highways. The M following line consists of pairs {X,Y}.

Output:
Single line for each test case containing "corrupt" or "not corrupt".("" are for clarity)

Constraints:

1<=N<=5000
N-1<=M<=(N*(N-1))/2
1<=X,Y<=N

Time limit:
1s

Sample Input 1:

3 3
1 2
2 3
3 1

Sample Output 1:
corrupt

Explanation:

1 and 2 are connected by a highway. 2 and 3 are connected by highway. So, indirectly 1 and 3 are also connected by highway. Highway between 1 and 3 is redundant. So, the minister is corrupt

Sample Input 2:

3 2
1 2
2 3

Sample Output 2:
not corrupt

Explanation:
There is no redundant highway. So the minister is not corrupt.

MELODY

Problem Code: D   Points: 300

Foster's Home for Imaginary Friends encourages the children to learn music. Bloo is learning to play the piano. To be honest, he is just horrible at it. To make him learn better, Bloo's teacher decides to allow him to use only three keys on the piano, key A, key B and key C. All keys produce different sounds. Key A and key B produce a sound of duration 1 second and key C produces a sound of duration 2 seconds.

Bloo wants to impress his teacher by writing a wonderful melody. He wonders how many different songs of length n seconds he can make.

Input:

The first line of input contains an integer t, the total number of test cases. T lines follow. Each line contains a single integer n, the length of song that Bloo wants to make.

Output:

For each test case, output a single integer representing the total number of different songs Bloo can make using only the three mentioned keys. Output the number of ways modulo $10^9 + 7$.

Constraints:

1<=t<=100

1<=n<=10^6

Sample Input:

2
1
2

Sample Output:

2
5

SAFETY

Problem Code: E   Points: 300

Humans have left the Earth and have migrated to the Gliese 581 solar system. After landing on our new planet, our next mission is to start building houses. For ease of navigation, the location on the planet where the spaceship landed has been given the coordinates [0,0].

There are a total of n families in this new Human colony. The ith family has built a house at coordinates [xi,yi]. For the safety of people, we need to set up a fence around all these houses. You, being the best computer programmer in the colony, have been asked to write a program that finds how the fence should be set up.

The fence should enclose within it all the houses as well as the space ship. A circular fence is not possible. The fence can only be a polygon of any number of vertices. As we need to conserve our resources, the length of the fences should be minimum possible.

Input:

The first line will contain the integer n. n lines follow. The ith line contains two space separated integers, denoting the coordinates of the house of ith family.

Output:

You have to output three things. First output the number of vertices of the polygon made by your fence. Now on different lines, output two space separated integers representing the x and y coordinates of each of the vertices in any order. And lastly output the length of the fence (strictly upto 4 decimal places).

Constraints:

1<=t<=100

1<=n<=10^3

Sample Input:

4
0 2
2 0
-2 0
0 -2

Sample Output:

4
0 2
2 0
-2 0

0 -2
8.0000

COMMUNICATION GAP:

Problem Code: F   Points: 300

The Human species is facing catastrophe. Scientists have detected that the Earth is headed right towards a black hole. We are doomed to extinct if we do not act fast. The leaders of all the countries in the world assemble to think of a solution. But before they start discussion about the current problem another problem comes up. Some leaders cannot communicate with each other directly as they don't understand each other's languages. A possible solution is that if two leaders cannot communicate directly they may do so indirectly by using some other leader/leaders as translators. For example, if leader A knows English only, leader B knows Hindi only and leader C knows English and Hindi both, then A and B will communicate with each other with C as a translator. But this solution has a drawback. It may happen that if a leader is not present, then some leaders may not be able to communicate with each other. In the above example, if leader C is absent, then A and B will not be able to communicate. We need to assign VIP status to these leaders. Your job is to find which leaders are VIP.

Input:

The first line contains two integers n and m. n is the number of leaders and m is the number of pairs of leaders who can communicate directly. M lines follow. Each line contains two integers a and b (1<=a,b<=n); meaning that leaders A and B can communicate with each other directly.

It is guaranteed that all leaders can communicate with each other directly or indirectly.

Output:

First output the number of leaders who have to assigned VIP status. On the second line output a space separated list of VIP leaders.

Constraints:

1<=n<=10000

1<=m<=n*(n-1)/2

Sample Input 1:

4 2
1 2
3 2
4 2

Sample Output 1:

1
2

Sample Input 2:

4 4
1 2
3 2
3 4
1 4

Sample Output 2:

0