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CSE-1201: Fundamentals of Programming

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A. Head or Tail

In ancient times, there existed a tribe called *shortHead*. As they had too little knowledge of the calendar, they just proposed and followed their own calendar that was called *300daysAYear*. Characteristics of that calendar is given below:

- It has 300 days in a year.
- It has 10 months in a year. Find the month details in the provided table.
- To celebrate a festival to convey their prayer, they add extra 5 days with each 100th year. This year is called *holyPrayer*.

300daysAYear		
Month Serial	Days in Regular Year	Days in holyPrayer Year
1	30	30
2	30	31
3	30	30
4	30	31
5	30	30
6	30	31
7	30	31
8	30	31
9	30	30
10	30	30

999daysAYear		
Month Serial	Days in Regular Year	Days in blackCutter Year
1	3	3
2	5	5
3	7	7
4	13	13
5	29	29
6	31	31
7	47	47
8	53	53
9	61	61
10	89	90
11	103	103
12	113	113
13	131	131
14	151	151
15	163	163

According to some secret inheritances, there also existed another tribe called *longTail*. As they had too little knowledge of the calendar, they just proposed and followed their own calendar that was called *999daysAYear*. Characteristics of that calendar is given below:

- It has 999 days in a year.
- It has 15 months in a year. Find the month details in the provided table.
- To avoid the fractional calculation, they add an extra day every 999th year. This year is called *blackCutter*.

It is evident that both the tribes had started counting their calendar from the same day when it was a sunny Sunday in “*bondhu*” country.

In this problem, you will be given a date according to one of the ancient calendars. You need to find the date for the other one. Note that all the countdown in a calendar starts from 1.

Input

A word indicating the calendar system and a date in the corresponding calendar (*date-month-year*).

Constraints

(25 cases) All the dates will be valid.

Output

First line should print a date in the alternate calendar considering that there exist only these two calendars in the world.
Second line should print the day of the week of that particular date.

See sample input and output for better understanding.

Sample Cases

Sample Input	Sample Output
300daysAYear 15-3-178	45-9-53 Sunday
999daysAYear 15-3-178	1-5-589 Thursday

B. DomsDay

The earth has been ignoring all the mistakes of human beings since its creation. At different times, it has signaled its anger by different natural calamities like earthquakes. Being the most ignorant species in this world, human beings have never given their attention to this matter. As a result, the earth is going to start the self destructive process after failing in every possible way to teach the self proclaimed intelligent species in this galaxy. The earth structure and the destructive process are described below:

- The earth has divided itself into different regions. Note that the shape of the earth can be described in an n-dimensional array.
- The earth randomly chooses a region and starts the process to destroy it. Note that the earth never chooses more than one region at a time to destroy.
- Following the previous step repeatedly, all the regions are destroyed and the massacre of the doomsday ends.

In this problem, you will be given the structure of the earth and the list of destroyed regions. Suppose, you are the only person who has the wisdom to save this world. You find a way to reorganize the regions of the earth before the earth starts the self destructive process so that you can create new earth(s) from the intact regions after the rage of the earth. The process can be described as:

The earth regions can be represented in a single dimensional array following a particular dimensional reading sequence like row-major, column-major for 2-D or something like this. From this single dimensional array a consecutive sequence of regions which are not destroyed can be used to create a new earth. You need to find the maximum size of the newly created earths.

Example:

Let the earth be represented by a 2-D array of size 5x3.

And the list of destroyed regions is: {(1,1), (3,0),(4,2)}.

Then, you can reorganize the region as:

Row-major: {(0,0),(0,1),(0,2),(1,0),(1,1),(1,2),(2,0),(2,1),(2,2),(3,0),(3,1),(3,2),(4,0),(4,2),(4,3)}

Thus, the new earths are:

Size-4: {(0,0),(0,1),(0,2),(1,0)}

Size-4: {(1,2),(2,0),(2,1),(2,2)}

Size-3: {(3,1),(3,2),(4,0)}

Size-1: {(4,3)}

Column-major: {(0,0),(1,0),(2,0),(3,0),(4,0),(0,1),(1,1),(2,1),(3,1),(4,1),(0,2),(1,2),(2,2),(3,2),(4,2)}

Size-3: {(0,0),(1,0),(2,0)}

Size-2: {(4,0),(0,1)}

Size-7: {(2,1),(3,1),(4,1),(0,2),(1,2),(2,2),(3,2)}

Therefore, the maximum size of the newly created earth can be: 7.

Input

First line contains N and M indicating the dimension of the earth and the number of destroyed regions, respectively.

Second line contains N integers representing the dimensional size of the earth.

Next M lines each contain N integers indicating the destroyed regions.

Constraints

(10 cases) 1<= N <= 2 and 0 <= M <= 100

(10 cases) 1<= N <= 5 and 0 <= M <= 1000

(5 cases) 1<= N <= 10 and 0 <= M <= 10000

Total size of cells of the earth representation will not exceed 1000000.

Output

A line with the size of the maximum possible earth as described.
See the sample input and output for better understanding.

Sample Cases

Sample Input	Sample Output
2 3 5 3 1 1 3 0 4 2	7
2 4 5 3 1 1 0 2 3 0 4 2	4

C. The Biggest Treasure Hunt

You must have known the name of El Dorado, the lost city of gold. Recently, a group of unfortunate treasure hunters has found the real existence of El Dorado. You may have been thinking why I am calling them unfortunate, but I am not describing it to you now.

After traveling numerous numbers of mountains and seas, they have successfully arrived at the gate of the legendary lost city. But, they can't enter the gate without your help. Because, there is a lock with an array of random numbers in the gate which can only be opened if the correct numerical combination is inserted.

The lock is a list of integers and the correct key is a converted version of the list when all the integers are prime numbers. You can change a number to make it a prime number by increasing or decreasing the number. When you are increasing a number by 1 unit, you will cost x treasure coins. On the other hand, you will cost y treasure coins if you decrease the number by 1 unit.

As there is more than enough treasure behind the gate, no one is afraid of losing some gold coins, you know. So, any of your answers that satisfy the criteria to open the gate will be accepted. But, I am a greedy person. So, I want to lose less treasure here, as nothing will satisfy me till death. Although any valid answer will be accepted, the answer with lower number of lose will be awarded higher points.

Input

First line contains three integers N , x and y indicating the size of the door key, the cost to increase and the cost to decrease a number, respectively.
Next line contains N integers.

Constraints

(10 Cases) $1 \leq N, x, y \leq 100$ and $1 \leq \text{Individual Number} \leq 1000$
(10 Cases) $1 \leq N, x, y \leq 10000$ and $1 \leq \text{Individual Number} \leq 10000$
(5 Cases) $1 \leq N, x, y \leq 100000$ and $1 \leq \text{Individual Number} \leq 10000000$

Output

A line containing N integers describing the array which can open the door..
See sample Input and Output for better understanding.

Sample Cases

Sample Input	Sample Output
5 3 2 2 4 8 11 17	2 5 7 19 23
5 3 2 2 4 8 13 17	2 7 11 5 23

D. Aloo String

“**Aloo String**” is a secret term in the field of string theory. You may have heard that potato, which is also known as aloo in different regions, can be used for any type of curry or foods. It is so common that it has become a brand. Thus, it has also made its own position in the field of string theory. “**Aloo String**” is the lexicographically lowest string that can be generated from a list of strings after taking all the common characters from that list of strings.

For example, you are given 3 strings “bac”, “abca”, and “acabxccdpefz”. After analyzing, we can find that there are 1 ‘a’, 1 ‘b’ and 1 ‘c’ common in these 3 strings. Now, all the possible strings using these common characters are - “bac”, “abc”, “bca”, “acb”, “cab”and “cba”. So, the “**Aloo String**” is “abc”.

Input

First line contains an integer N indicating the number of String.
Next N lines contain N strings of alphabets only.

Constraints

- (5 Cases) 1 <= N <= 10 and 1 <= Length of Input String <= 100
- (5 Cases) 1 <= N <= 100 and 1 <= Length of Input String <= 100
- (5 Cases) 1 <= N <= 1000 and 1 <= Length of Input String <= 100
- (5 Cases) 1 <= N <= 1000 and 1 <= Length of Input String <= 1000
- (5 Cases) 1 <= N <= 10000 and 1 <= Length of Input String <= 10000

Output

A line containing the Output “**Aloo String**” as described in the description.
See sample Input and Output for better understanding.

Sample Cases

Sample Input	Sample Output
3 bac abca acabxccdpefz	abc
4 csedu du understand beautifulbangladesh	du