Coding questions

<u>Constellation</u>
Three characters { #, *, . } represents a constellation of stars and galaxies in space. Each galaxy is demarcated by # characters. There can be one or many stars in a given galaxy. Stars can only be in the shape of vowels { A, E, I, O, U }. A collection of * in the shape of the vowels is a star. A star is contained in a 3x3 block. Stars cannot be overlapping. The dot(.) character denotes empty space.
Given 3xN matrix comprising of { #, *, . } character, find the galaxy and stars within them.
Note: Please pay attention to how vowel A is denoted in a 3x3 block in the examples section below.
Constraints
3 <= N <= 10^5
Input
Input consists of a single integer N denoting the number of columns.
Output
The output contains vowels (stars) in order of their occurrence within the given galaxy. The galaxy itself is represented by the # character.
<u>Example 1</u>
Input
18
* . * # * * * # * * * # * * * . * .
* . * # * . * # . * . # * * * * * *
* * * # * * * # * * * # * * * * . *
Output
U#O#I#EA
Explanation
As can be seen, the stars make the image of the alphabets U, O, I, E, and A respectively.

<u>Example 2</u>
Input
12

* . * # . * * * # . * .
* . * # . . * . # * * *
* * * # . * * * # * . *
Output
U#I#A
Explanation
As it can be seen the stars make the image of the alphabet U, I, and A.

Prime Time Again
Here on earth, our 24-hour day is composed of two parts, each of 12 hours. Each hour in each part has a corresponding hour in the other part separated by 12 hours: the hour essentially measures the duration since the start of the daypart. For example, 1 hour in the first part of the day is equivalent to 13, which is 1 hour into the second part of the day.
Now, consider the equivalent hours that are both prime numbers. We have 3 such instances for a 24-hour 2-part day:
5~17
7~19
11~23
Accept two natural numbers D, P >1 corresponding respectively to several hours per day and the number of parts in a day separated by a space. D should be divisible by P, meaning that the number of hours per part (D/P) should be a natural number. Calculate the number of instances of equivalent prime hours. Output zero if there is no such instance. Note that we require each equivalent hour in each part of a day to be a prime number.
Example:
Input: 24 2
Output: 3 (We have 3 instances of equivalent prime hours: 5~17, 7~19, and 11~23.)
Constraints
10 <= D < 500
2 <= P < 50
Input

The single line consists of two space-separated integers, D and P corresponding to the number of. hours per day and number of parts in a day respectively
Output
Output must be a single number, corresponding to the number of instances of equivalent prime number, as described above

Example 1
Input
36 3
Output
2
Explanation
In the given test case D = 36 and P = 3
Duration of each daypart = 12
2~14~X
3~15~X
5~17~29 - an instance of equivalent prime hours
7~19~31 - an instance of equivalent prime hours
11~23~X
Hence the answer is 2.

Minimum Gifts
A Company has decided to give some gifts to all of its employees. For that, the company has given some rank to each employee. Based on that rank, the company has made certain rules for distributing the gifts.
The rules for distributing the gifts are:
Each employee must receive at least one gift.
Employees having higher ranking get a greater number of gifts than their neighbours.
What is the minimum number of gifts required by the company?
Constraints
1 < T < 10

1 < N < 100000

1 < Rank < 10^9

Input

The first line contains integer T, denoting the number of test cases.

For each test case:

The first line contains integer N, denoting the number of employees.

The second line contains N space-separated integers, denoting the rank of each employee.

Output

For each test case print the number of minimum gifts required on a new line.

Example 1

Input

2

5

1 2 1 5 2

2

1 2

Output

7

3

Explanation

For test case 1, adhering to the rules mentioned above,

Employee # 1 whose rank is 1 gets one gift

Employee # 2 whose rank is 2 gets two gifts

Employee # 3 whose rank is 1 gets one gift

Employee # 4 whose rank is 5 gets two gifts

Employee # 5 whose rank is 2 gets one gift

Therefore, total gifts required is 1 + 2 + 1 + 2 + 1 = 7

Similarly, for test case 2, adhering to the rules mentioned above,

Employee # 1 whose rank is 1 gets one gift

Employee # 2 whose rank is 2 gets two gifts

Therefore, the total gifts required is 1 + 2 =

Minimize the sum

Given an array of integers, perform at most K operations so that the sum of elements of a final array is minimum. An operation is defined as follows -

Consider any 1 element from the array, arr[i].

Replace arr[i] by floor(arr[i]/2).

Perform the next operations on the updated array.

The task is to minimize the sum after utmost K operations.

Constraints

1 <= N, K <= 10^5.

Input

The first line contains two integers N and K representing the size of the array and the maximum number of operations that can be performed on the array respectively.

The second line contains N space-separated integers denoting the elements of the array, arr.

Output

Print a single integer denoting the minimum sum of the final array.

Input

4 3

20 7 5 4

Output

17

Explanation

Operation 1 -> Select 20. Replace it with 10. New array = [10, 7, 5, 4]

Operation 2 -> Select 10. Replace it with 5. New array = [5, 7, 5, 4].

Operation 3 -> Select 7. Replace it with 3. New array = [5,3,5,4].

Sum = 17.

Railway Station

Given the schedule of trains and their stoppage time at a Railway Station, find a minimum number of platforms needed.

Note -

If Train A's departure time is x and Train B's arrival time is x, then we can't accommodate Train B on the same platform as Train A.
Constraints
1 <= N <= 10^5
0 <= a <= 86400
0 < b <= 86400
Number of platforms > 0
Input
The first line contains N denoting the number of trains.
Next N line contains 2 integers, a and b, denoting the arrival time and stoppage time of the train.
Output
A single integer denotes the minimum number of platforms needed to accommodate every train.
Example 1
Input
3
10 2
5 10
13 5
Output
2
Explanation
The earliest arriving train at time t = 5 will arrive at platform# 1. Since it will stay there till t = 15, the train arriving at time t = 10 will arrive at platform# 2. Since it will depart at time t = 12, the train arriving at time t = 13 will arrive at platform# 2.
Example 2
Input
2
2 4
6 2
Output
2

Explanation
Platform #1 can accommodate train 1.
Platform #2 can accommodate train 2.
Note that the departure of train 1 is the same as the arrival of train 2, i.e. 6, and thus we need a separate platform to accommodate train 2.

Count Pairs
Given an array of integers A, and an integer K find a number of happy elements. Element X is happy if there exists at least 1 element whose difference is less than K i.e. an element X is happy if there is another element in the range [X-K, X+K] other than X itself.
Constraints
1 <= N <= 10^5
0 <= K <= 10^5
0 <= A[i] <= 10^9
Input
The first line contains two integers N and K where N is the size of the array and K is a number as described above. The second line contains N integers separated by space.
Output
Print a single integer denoting the total number of happy elements.
Example 1
Input
6 3
5 5 7 9 15 2
Output
5
Explanation
Other than number 15, everyone has at least 1 element in the range [X-3, X+3]. Hence they are all happy elements. Since these five are in number, the output is 5.
Example 2
Input

3 2
1 3 5
Output
3
Explanation
All numbers have at least 1 element in the range [X-2, X+2]. Hence they are all happy elements. Since these three are in number, the output is 3.

<u>Critical Planets</u>
The war between the Republic and the Separatists is escalating. The Separatists are on a new offensive. They have started blocking the path between the republic planets (represented by integers) so that these planets surrender due to the shortage of food and supplies. The Jedi council has taken note of the situation and they have assigned Jedi Knight Skywalker and his Padawan Ahsoka to save the critical planets from blockade (Those planets or systems of planets which can be accessed by only one path and may be lost if that path is blocked by separatist).
Skywalker is preparing with the clone army to defend the critical paths. He has assigned Ahsoka to find the critical planets. Help Ahsoka to find the critical planets(C) in ascending order. You only need to specify those planets which have only one path between them and they cannot be accessed by any other alternative path if the only path is compromised.
Constraints
M <= 10000
N <= 7000
Input
The first line contains two space-separated integers M and N, where M denotes the number of paths between planets and N denotes the number of planets.
Next M lines, each contains two space-separated integers, representing the planet numbers that have a path between them.
Output
Clines containing one integer representing the critical planet that they need to save in ascending order of the planet number if no planet is critical then print -1

Time Limit

1

Example 1

Input

3 4

0 1

1 2

2 3

Output

0

1

2

3

Explanation

Since all the planets are connected with one path and cannot be accessed by any alternative paths hence all the planets are critical.

Example 2

Input

7 6

0 2

0 1

1 2

2 3

4 5

3 4

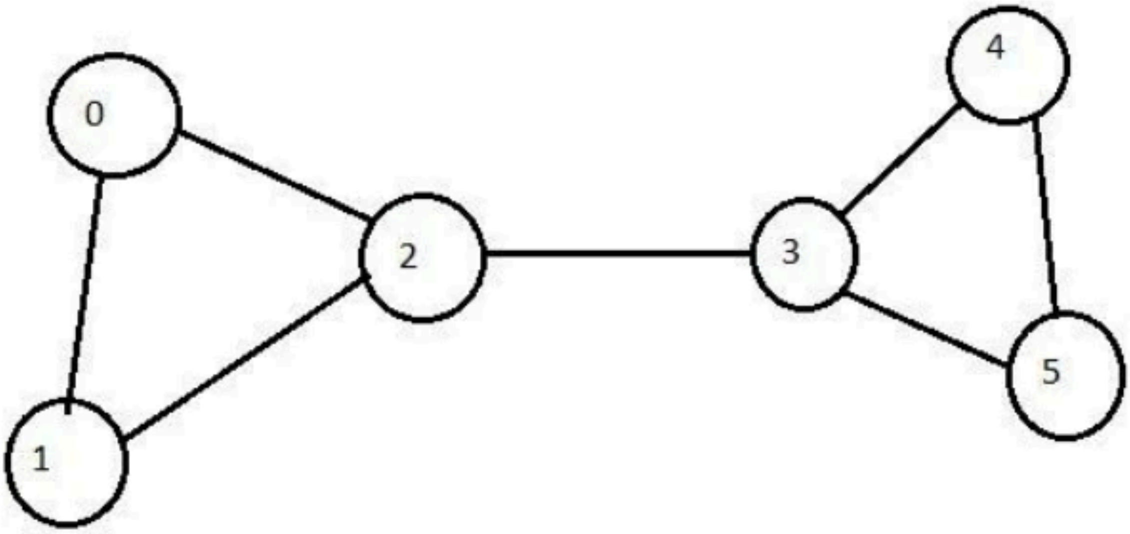
3 5

Output

2

3

Explanation



If the republic loses the path between 2 and 3 then the two systems of planets will not be able to communicate with each other. Hence 2 and 3 are critical planets.