Section A

Q1)
Given a list of integers S and a target number k, write a program that returns the subset of S that adds up to k. If such a subset cannot be made, print null.

For eg.1. S=[12,61,5,9,2,1] and k = 24
[12,9,2,1]
2.S=[2,31,45,67,8] and k=79
null

Q2) Bob is a loyal customer of his neighborhood department store. As such he has been awarded a store credit X $ to purchase items from the store. However Bob decides to buy 2 items, One of price M $ and another from the credit remaining. Given the prices of items available in the store , help Bob find out how many items can he buy from the store.

Input:
The first line contains the value of store credit X, and the value of M separated by a whitespace. The second line contains the number of items in the store(n). The next n lines contain the prices of the items present in the store in sorted order.

Output:
Print "YES"(without the quotes) if Bob can buy 2 items , and "NO"(without the quotes) if he is not able to do so.

Sample Input #1

5 3
5
2
3
5
6
7

Sample Output #1
YES

Constraints:
n<10^5
X<10^5
M<10^5

Q3) Count of 1-bit and 2-bit characters in the given binary string?
Given two special characters, the first character can be represented by one bit which is 0 and the second character can be represented by two bits either 10 or 11. Now given a string represented by several bits. The task is to return the number of characters it represents.

Test Case:
Input: “1011110”
output: 4
numbers to be counted:”10”,”11”,”11”,”0”

Q4) Find Sum of digits with even number of 1’s in their binary representation?
Given an array arr[] of size N. The task is to find the sum of the digits of all array elements which contains even number of 1’s in it’s their binary representation.
Test Case:
Input: [4,5,9]
output: 14

Q5) Find Pair with largest sum which is less than K in the array?
Given an array **arr[]** of size **N** and an integer **K**. The task is to find the pair of intergers such that their sum is maximum and but less than **K.**

Test Case:
Input: [10,4,5,6],
k=12
output: 5,6

Q6) Emirp is the word “prime” spelled backwards, and it refers to a prime number that becomes a new prime number when you reverse its digits. Emirps do not include palindromic primes (like 151 or 787) nor 1-digit primes like 7. 107, 113, 149, and 157 – reverse them and you’ve got a new prime number on your hands. Given a number n, the task is to print all Emrips smaller than or equal to n.

Input : n = 40
Output : 13 31

Q7) You are given a number N. The task is to divide it into K unique parts such that the sum of these parts is equal to the original number and the gcd of all the parts is maximum. Print the maximum gcd if such a division exists else print -1.

Input: N = 6, K = 3

Output: 1

Q8) Ugly numbers are numbers whose **only prime factors are 2, 3 or 5**. The sequence 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, … shows the first 11 ugly numbers. By convention, 1 is included. Write a program to find $\mathbf{N^{th}}$ Ugly Number.
Input: N

Output:
Print the $\mathbf{N_{th}}$ Ugly Number.
Constraints:

$1 \leq N \leq 10000$

Section B

Q1) Aliquot Sequence
Given a number n, the task is to print its Aliquot Sequence. Aliquot Sequence of a number starts with itself, remaining terms of the sequence are sum of proper divisors of immediate previous term. For example, Aliquot Sequence for 10 is 10, 8, 7, 1, 0. The sequence may repeat. For example, for 6, we have an infinite sequence of all 6s. In such cases we print the repeating number and stop.
Examples:
Input: n = 10
Output: 10 8 7 1 0
Sum of proper divisors of 10 is 5 + 2 + 1 = 8.
Sum of proper divisors of 8 is 4 + 2 + 1 = 7.
Sum of proper divisors of 7 is 1
Sum of proper divisors of 1 is 0
Note that there is no proper divisor of 1.

Input : n = 6
Output : 6

Q2) Given a string S consisting of only 1s and 0s, find the number of substrings which start and end both in 1.
In this problem, a substring is defined as a sequence of continuous characters Si, Si+1, ..., Sj where $1 \leq i \leq j \leq N$

INPUT
Length of string and the String.
OUTPUT
Number of substrings
EXAMPLE

Input: 4, 1111
Output: 10

Q3) T.M.A Pai has N plants arranged in a line in decreasing order of height. Initially the height of the plants are X0,X1,……..XN.
The plants are growing, after each hour the height of the i-th plant increases by i millimetres. Find the minimum number of integer hours that Mr.Pai must wait to have two plants of the same height.

INPUT

Number of trees N ,and the heights of trees X1,X2,……..XN.

OUTPUT

Minimum number of integer hours for two plants to have the same height.

SAMPLE INPUT
N=3
8 4 2
OUTPUT: 2

Q4) Ash has two sets of games. The two sets are represented by two strings a & b. The sets contain characters from ‘a’ to ‘z’. Each letter will denote a specific game, for example, ‘r’ for Road Rash, ‘g’ for GTA. Now, since the games are kept in CD cases, his friend tells him to make them look the same.

- Ash is supposed to pick any two consecutive games of the same type, and take out one of them. For example, if a deck is “mmmxx”, he can change it to “mmmx” by taking out one of the last two consecutive ‘x’s, or he change it to “mmxx” by doing the same from the start.

You need to tell whether Ash can make the two sets equal by applying the above operation as many times as he wants. Print “Yes”[without quotes] if he can, otherwise print “No”.

Input:

The first line of contains a string **a**.
The second line contains a string **b**.
Output:
For each test case, output "Yes" [without quotes] or "No" [without quotes] depending on the case.

Constraints

- Each character of **a, b** will be between 'a' and 'z'.
- **1** ≤ length of string **a** ≤ **50**
- **1** ≤ length of string **b** ≤ **50**

Example

Input:
rrrjj
rrrj
Output:
Yes

Q5) Mary is trying to help the air get cleaner in her house. She decides to grow plants in the certain places inside the house. We can consider her house to be a rectangular matrix of dimensions P x Q. If S[i][j] is positive, then it means that S[i][j] litres of oxygen are produced by the plants in that small area with (i,j) coordinates. On the other hand, a negative value of S[i][j] indicates that some pests live in that small area, who consume S[i][j] litres of oxygen every day. The pest control informed Mary about an important fact. If the plants in her house will be producing A less litres of oxygen every day than it produces now, the air won't be as clean as she wants it to be. So now Mary is interested in the question: how many ways exist for choosing a rectangular region for the plan.

Input

The first line contains three space-separated integers **P**, **Q**, and **A**. The following **P** lines contain **Q** integers each and describe the cells of the matrix **S**.

Output

Output a single line containing one integer - the number of rectangles where the plants can be kept without air quality getting worse.

Constraints

- **1 ≤ P, Q ≤ 150**
- **-10^9 ≤ S[i][j] ≤ 10^9**
- **1 ≤ A ≤ 10^9**

Example
Input:
2 3 7
1 2 3
4 5 6
Output:
11

Q6) Rumbling is an important tactic in the game of chess. A piece is said to perform a rumble if
1) It is on a safe square, i.e., the next move by the opponent does not kill the piece
2) It targets atleast 2 of the opponents pieces in its next move. So even if the opponent moves one of his pieces to safety, one of his remaining pieces can be killed.

You are given an **NxN** board, containing **M** White Queens. Remember, a Queen can move vertically, horizontally and diagonally; and kills any opponents piece directly in these directions. A Knight has 8 possible moves from position (i,j), viz (i+1,j+2), (i+1,j-2), (i-1,j+2), (i-1,j-2), (i+2,j+1), (i+2,j-1), (i-2,j+1), (i-2,j-1) (while remaining inside the NxN board). You have to find out the number of unoccupied positions on the NxN board, where a Black Knight can be placed such that it rumbles atleast 2 Queens.

INPUT:
The first line contains two integers **N** and **M**
Then M lines follow, ith line containing two space separated integers X[i] and Y[i], the coordinates of the ith Queen

OUTPUT:
For each testcase, output a single line containing the answer to the question

CONSTRAINTS:
1<=X[i],Y[i]<=N
0<=M<=N*N
40 points : 1<=N<=8
60 points : 1<=N<=1000
No two queens can be in the same square.

SAMPLE INPUT:
5 2
1 1
3 1

SAMPLE OUTPUT:
1

Section C

Q1) Given N integers A1, A2, …. AN, Dexter wants to know how many ways he can choose three numbers such that they are three consecutive terms of an arithmetic progression.

Meaning that, how many triplets (i, j, k) are there such that $1 \le i < j < k \le N$ and $A_j - A_i = A_k - A_j$.

So the triplets (2, 5, 8), (10, 8, 6), (3, 3, 3) are valid as they are three consecutive terms of an arithmetic progression. But the triplets (2, 5, 7), (10, 6, 8) are not.

Input Format:

First line of the input contains an integer N ($3 \leq N \leq 100000$). Then the following line contains N space separated integers A1, A2, …, AN and they have values between 1 and 30000 (inclusive).

Output Format:
Output the number of ways to choose a triplet such that they are three consecutive terms of an arithmetic progression.

Sample Input #1:

10
3 5 3 6 3 4 10 4 5 2

Sample Output #1:

9

Sample Explanation #1:
1 : (i, j, k) = (1, 3, 5), (A_i, A_j, A_k) = (3, 3, 3)
2 : (i, j, k) = (1, 6, 9), (A_i, A_j, A_k) = (3, 4, 5)
3 : (i, j, k) = (1, 8, 9), (A_i, A_j, A_k) = (3, 4, 5)
4 : (i, j, k) = (3, 6, 9), (A_i, A_j, A_k) = (3, 4, 5)
5 : (i, j, k) = (3, 8, 9), (A_i, A_j, A_k) = (3, 4, 5)
6 : (i, j, k) = (4, 6,10), (A_i, A_j, A_k) = (6, 4, 2)
7 : (i, j, k) = (4, 8, 10), (A_i, A_j, A_k) = (6, 4, 2)
8 : (i, j, k) = (5, 6, 9), (A_i, A_j, A_k) = (3, 4, 5)
9 : (i, j, k) = (5, 8, 9),(A_i, A_j, A_k) = (3, 4, 5)

Q2) Anna loves palindromes. A palindrome is a string which reads the same written forwards and backwards, Eg.. ANNA, OYO are palindromes. Words like YOYO are not palindromes because they read differently forwards and backwards.
One day, her teacher decides to test her knowledge of palindromes. She gives her a string of N letters from A to Z and asks her Q number of questions. The ith question is that if the string contained between L and R(both inclusive),rearranging the letters if necessary, is a palindrome or not. Help Anna out with her test!

Input Format
The first line contains 2 space separated integers N and Q , denoting number of questions the teachers asks. The next Q lines which follow, contain 2 space separated integers, L and R, after which the input for the next case begins.

Output Format
For each case output 1 line of text to STDOUT, which would describe how many palindrome formations are possible.

Sample Input #1;

7 5
ABAACCA
3 6
4 4
2 5
6 7
3 7
Sample Output #1:
3

Sample Explanation #1:
For the first test string ABAACCA
1.For the first question , the string to be checked is AACC. This can be rearranged to form a palindrome ACCA or CAAC.
2.For the second question, the string to be checked is A. Its a palindrome by itself.
3.For the third question , string is BAAC. No rearrangement is possible so that this becomes a palindrome.
4.For the fourth question, string is CA. Again similar to previous question.
5.For the fifth question, string is AACCA. It is possible to rearrange this to CAAAC or ACACA.
Hence in total there are 3 cases where palindrome is possible, hence output is 3.

Constraints:
1<=L<=R<=N
1<=N<=10^5
1<=Q<=10^5

Q3) Bob has created a table which encodes the results of some operation -- a function of two arguments. But instead of a boring multiplication table of the sort you learn by heart at prep-

school, he has created a GCD (greatest common divisor) table! So he now has a table (of height a and width b), indexed from (1,1) to (a,b), and with the value of field (i,j) equal to gcd(i,j). He wants to know how many times he has used prime numbers when writing the table.

Input

Each test case consists of two space separated integers, $1 \leq a,b < 10^7$.

Output

For each test case write one number - the number of prime numbers Bob wrote in that test case.

Sample Input #1:
10 10

Sample Output #1:

30

Sample Input #2:
100 100

Sample Output #2:

2791

Q4) A head to tail ordering of strings is the one in which the last letter of the previous word is the same as the first letter of the following word. For eg. ‘ISTE’ can be followed by ‘Epic’.

The task is to write a code to accept a set of finite strings and determine if such an ordering is possible by arranging them in a head to tail sequence.

Input:

The first line contains an integer 'N' denoting the size of array. The next 'N' lines contains N strings. Only letters 'a' through 'z' will appear in the word(Lower case). The same word may appear several times in the list.

Output:

"Head to tail ordering is possible." if it is possible to arrange all the words in a sequence such that the first letter of each word is equal to the last letter of the previous word. All the plates from the list must be used, each exactly once else output "Head to tail ordering is not possible.".(no need to output the sequence)

Sample I/O

Input:

4

Big

Smart

Toy

Gems

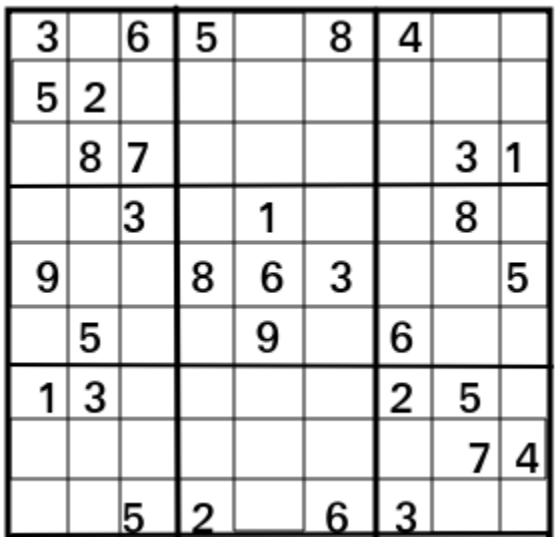
Output:

Head to tail ordering is possible

Explanation:. Big Gems Smart Toy

Q5) Given an incomplete Sudoku configuration in terms of a 9 x 9 2-D square matrix (mat[][]). The task to print a solved Sudoku. For simplicity you may assume that there will be only one unique solution.

Sample Sudoku for you to get the logic for its solution:



Input:

Each test case contains 9*9 space separated values of the matrix mat[][] representing an incomplete Sudoku state where a 0 represents empty block.

Output:

For each test case, in a new line, print the space separated values of the solution of the the sudoku.

Constraints:

0 <= mat[] <= 9

Example:

Input:

3 0 6 5 0 8 4 0 0

5 2 0 0 0 0 0 0 0

0 8 7 0 0 0 0 3 1

0 0 3 0 1 0 0 8 0

9 0 0 8 6 3 0 0 5

0 5 0 0 9 0 6 0 0

1 3 0 0 0 0 2 5 0

0 0 0 0 0 0 0 7 4

0 0 5 2 0 6 3 0 0

Output:

3 1 6 5 7 8 4 9 2

5 2 9 1 3 4 7 6 8

4 8 7 6 2 9 5 3 1

2 6 3 4 1 5 9 8 7

9 7 4 8 6 3 1 2 5

8 5 1 7 9 2 6 4 3

1 3 8 9 4 7 2 5 6

6 9 2 3 5 1 8 7 4

7 4 5 2 8 6 3 1 9