Colour: Green

Problem A: The poor man and the King

Problem Statement

The poor man went to the King and said, “Lord, I cannot maintain my family. Please give me some wealth so that I can survive with my wife and children.” The King replied, “I shall grant you a piece of land so that you can cultivate and grow food for your family. In the southern part of the Kingdom there is a rectangular forest. Trees have been planted there at regular intervals. Some of the trees have been cut for use. You are allowed to take any rectangular piece of land that does not contain any tree. You need not go to the forest to select the piece of land. I have a map containing 1’s at places where there is a tree and 0s at points where the tree has been cut.”

Help the poor man to find out the largest piece of land. Area of the land is measured in units of number of trees that were there. Your program should take a matrix of 1’s and 0’s as input and output the area of the largest rectangular piece of land that contain no tree. Be careful about the efficiency of your program.

Input

The input file may contain multiple test cases. The first line of each test case contains two integers M and N ($1 \leq M,N \leq 100$) giving the number of rows and columns in the matrix that follows. Each of the next M lines contains N symbols (either ‘0’ or ‘1’). Two consecutive symbols in a line will be separated by a single space. The input terminates with two zeros for M and N.

Output

For each test case in the input print a line giving the area (in terms of the number of trees were there) of the largest rectangular piece of land containing no tree.

Sample Input

```
6 7

0110110

0000010

1000001

0100001
```

```
1100010

1101100

00
```

Sample Output

```
12
```

Colour: Black

Problem B: Magic Matrix

Problem Statement

A magic square is a n×n matrix filled with the integers from 1 to n^2 such that the sum of the integers in each row, column, and diagonal are equal.

Your task is to generate a magic square for a given odd integer nn.

Input

The input consists of a single integer n ($1 \leq n \leq 15$), which is guaranteed to be odd.

Output

Output the n×n magic square. Each of the n lines should contain n unique integers separated by a space.

Example

Input

5

Output

17 24 1 8 15

23 5 7 14 16

4 6 13 20 22

10 12 19 21 3

11 18 25 2 9

Colour: Red

Problem C: Chat room

Problem Statement

Suppose there are a number of good users using an Internet chat room, which is a shared text chat space. Now there are some bad guys in the Internet who would come to this room and would have no respect or interest in the topic of discussion in the group. They would start typing strings of garbage characters, start unsolicited advertisements of certain URLs or businesses, or paste the same string again and again just to disturb others in the room.

When I asked about this problem to Dr. Nuri, he suggested the following scheme. Let us define consonants to be all letters in a-z and A-Z except a, e, i, o, u, y, A, E, I, O, U and Y.

A user should be able to send a line to the chat room unless

- the line has more than 5 consecutive consonants, or
- the line contains at least one word which has more than 4 consecutive consonants and the user sent more than 2 such lines in last 10 lines sent, or
- The user sent the same line more than once in last 10 sentences sent.

Input

Input consists of several lines. The first line contains an integer n, which is the number of lines in the shared text space. Then follow n lines each consisting of not more than 200 ASCII characters.

Output

For each line of input print ‘y’ if the line is acceptable according to the criteria set above and ‘n’ otherwise in separate lines. See the sample output for example.

Sample Input

12

hello

how r u?

where r u from?

kjhh kh kgkjhg jhg

where r u from?

i am from London, Ontario, Canada

how r you nxw?

now

where r u from?

kjhh kh kgkjhg jhg

very good

it is very cold here.

Sample Output

y

y

y

n

y

y

y

y

n

n

y

y

Colour: White

Problem D: Convex polygon

Problem Statement

You are given several test cases, each containing a set of points in a 2D plane. For each test case, determine if the points form a convex polygon.

Input

- The first line of the input contains an integer T ($1 \le T \le 100$), the number of test cases.
- For each test case:
    - The first line contains an integer N ($3 \le N \le 100$), the number of points.
    - The next N lines each contain two space-separated integers x and y ($-10^3 \le x, y \le 10^3$), representing the coordinates of the points.

Output

For each test case, output `YES` if the points form a convex polygon and `NO` otherwise.

Constraints

- Coordinates are integers within the range [−1000, 1000].
- Points are given in order such that they form a simple polygon (non-intersecting edges).

Example

Input

```
3

4

0 0

2 0

2 2

0 2
```

```
5

0 0

2 0

3 2

2 4

0 4

3

0 0

3 0

3 3
```

Output

```
YES

NO

NO
```

Explanation

- In the first test case, the points form a convex quadrilateral (a square).
- In the second test case, the points form a concave pentagon (an irregular shape).
- In the third test case, the points form a concave triangle.

Colour: Yellow

Problem E: Duplicate Remover

Problem Statement

You are given an array of integers. Your task is to remove all duplicate elements from the array and print the unique elements in their original order of first appearance.

Input

The first line contains an integer nn ($1 \leq n \leq 1000$), the number of elements in the array.

The second line contains nn integers representing the elements of the array. Each integer a_i ($1 \leq a\_i \leq 1000$).

Output

Print a single line containing the unique elements of the array in the order of their first appearance.

Example

Input

8

4 5 2 2 4 3 2 1

Output

4 5 2 3 1

Input

10

10 10 10 10 10 10 10 10 10 10

Output

10

Colour: Pink

Problem F: The Cheating Accountant

Problem Statement:

You are a clever but a cheating accountant working for a company. Each month, you receive the financial results of the company in the form of a sequence of integers. Your goal is to impress the manager by reporting only the longest increasing subsequence of these financial results. This means you will selectively pick the months that show an increasing trend and present them as the company's performance report. Given the monthly financial results, find the length of the longest increasing subsequence that you can report to the manager.

Input:

- An integer n ($1 \leq n \leq 1000$) representing the number of months.

- A sequence of n integers $a_1, a_2, \ldots, a_n$ where each a_i is the financial result for the i-th month.

Output:

Print a single integer representing the length of the longest increasing subsequence that you can report.

Example:

Input:

6

5 2 8 6 3 6

Output:

3

Explanation:

The longest increasing subsequence in this example could be [2, 3, 6], it has a length of 3.

Input:

8

10 22 9 33 21 50 41 60

Output:

5

Explanation:

The longest increasing subsequence in this example is [10, 22, 33, 50, 60]. It has a length of 5.

Colour: Purple

Problem G: Word Grid Search Puzzle

Problem Statement:

You are given a 2D grid of characters and a word. Your task is to determine if the word exists in the grid. The word can be constructed from letters of sequentially adjacent cells, where "adjacent" cells are those horizontally or vertically neighboring. The same letter cell may not be used more than once.

Input Format:

The first line contains two integers n and m ($1 \leq n, m \leq 200$), the number of rows and columns. The next n lines each contain m characters representing the grid. The last line contains a single string word, the word to search for.

Output:

- Print YES if the word exists in the grid, otherwise print NO.

Constraints:

- The word length will not exceed 10^4.

- All characters in the grid and the word are uppercase English letters.

Example:

Input:

3 4

ABCD

SFCS

ADEE

ABCCED

Output:

YES

Input:

3 4

ABCD

SFCS

ADEE

SEE

Output:

YES

Input:

3 4

ABCD

SFCS

ADEE

ABCB

Output:

NO

Explanation:

In the first example, the word "ABCCED" can be found in the grid by the following path: (1,1) -> (1,2) -> (2,2) -> (3,2) -> (3,3) -> (2,3).

In the second example, the word "SEE" can be found in the grid by the following path: (3,1) -> (3,2) -> (2,2).

In the third example, the word "ABCB" cannot be found in the grid.

Colour: Blue

Problem H: Pattern Count

Problem Statement

You are given a target string S and a pattern string P. Count how many times the pattern P appears as a substring in the target string S. This problem requires implementing a function to count occurrences of the pattern string P within the target string S. The solution should efficiently handle the input size constraints.

Notes: Consider edge cases such as when P is longer than S or when either string is empty.

Input

The input consists of two lines:

- The first line contains the target string S.
- The second line contains the pattern string P.

Output

Output a single integer, the number of times the pattern P appears as a substring in the target string S.

Constraints

The strings S and P consist only of lowercase English letters ('a'-'z'). $1 \leq \text{len}(S), \text{len}(P) \leq 1000$

Example

Input

```
abababab

aba
```

Output

```
3
```

Colour: Orange

Problem I: Libyan Airlines

Problem Statement

Libyan Airlines is a growing airline company that offers various flight routes between cities. As part of their expansion, they want to develop a system to help customers find all possible flight routes between two cities, along with their respective costs. Given the cities and the available direct flights between them, your task is to list all possible paths from a starting city to a destination city, sorted by their total cost in ascending order.

Input Format

1. The first line contains an integer N ($2 \leq N \leq 100$), the number of cities.
2. The second line contains an integer M ($1 \leq M \leq 1000$), the number of direct flights.
3. The next M lines each contain three space-separated integers u, v, and p ($1 \leq u, v \leq N$; $1 \leq p \leq 1000$), representing a direct flight from city u to city v with a price of p.
4. The next line contains two integers S and D ($1 \leq S, D \leq N$), the starting city and the destination city.

Output Format

Output all possible paths from the starting city S to the destination city D along with their respective costs. Each path should be printed on a new line in the format:

```
path1: city1 -> city2 -> ... -> cityN, cost

path2: city1 -> city2 -> ... -> cityN, cost

...
```

The paths should be sorted by total cost in ascending order. If there are no possible routes, output `-1`.

Constraints

- There are no self-loops (a city does not have a flight to itself).
- There can be multiple flights between the same pair of cities with different prices.

Sample Input

```
4

5

1 2 100

2 3 200

3 4 300

1 3 500

1 4 700

1 4
```

Sample Output

```
1 -> 2 -> 3 -> 4, 600

1 -> 4, 700

1 -> 3 -> 3 ->4, 800
```

Colour: Silver

Problem J: Spiral Matrix

Problem Statement

You are given a m×n matrix. Your task is to print the elements of the matrix in spiral order, starting from the top-left corner and moving to the right initially.

Input

The first line contains two integers mm and nn ($1 \leq m, n \leq 100$), representing the number of rows and columns of the matrix.

The next mm lines each contain nn integers representing the elements of the matrix. Each integer a_{ij} ($1 \leq a_{ij} \leq 1000$).

Output

Print a single line containing the elements of the matrix in spiral order, separated by spaces.

Example

Input

3 3

1 2 3

4 5 6

7 8 9

Output

1 2 3 6 9 8 7 4 5

Input

4 4

1 2 3 4

5 6 7 8

9 10 11 12

13 14 15 16

Output

1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10