

LEBANESE AMERICAN UNIVERSITY
School of Arts and Science
Department of Computer Science and Mathematics

CSC 310: Algorithms and Data Structures

Lab IX

Important Note: Input should be read from a file named after the problem name. For example, problem 1 has the input file “p1.in”.

Problem 1

Given N as the size of a $N \times N$ chessboard, check whether you can place N queens on the chessboard without threatening the other queens. A queen can take any other queen diagonally, horizontally, and vertically.

Input

The first line is an integer T representing the number of test cases.
Each test case is made up of two integer N .

Output

For each test case, output “yes” if you can place the N queens “no” otherwise.

Sample Input

2
8
4

Sample Output

yes
no

Problem 2

Given an undirected graph $G (V, E)$, where V is the set of vertices and E is the set of edges, check whether G is k colorable, such that no 2 vertices have the same color. You may color G with up to k colors.

Input

The first line is an integer T representing the number of test cases.

Each test case is made up of two integers n and m representing the number of vertices and edges respectively. Then m lines follow, each containing two integers u and v which are the endpoints of edge uv . Then a single integer k .

Output

For each test case, output “yes” if G is k colorable “no” otherwise.

Sample Input

```
2
5    5
0    1
0    2
1    3
2    3
3    4
0    3
3
5    10
0    1
0    2
0    3
0    4
1    2
1    3
1    4
2    3
2    4
3    4
4
```

Sample Output

```
yes
no
```

Problem 3

Given a rod of length n inches and an array of prices that contains prices of all pieces of size smaller than n . Determine the maximum value obtainable by cutting up the rod and selling the pieces.

Input

The first line of input is an integer T representing the number of test cases. Each test case is made up of a single integer n representing the length of the rod respectively. Then n integers follows the cost of each piece where the size of the piece is the index of the array starting at 1.

Output

For each test case, output the maximum value obtainable by cutting up the rod.

Sample Input

```
1
8
1 5 8 9 10 17 17 20
```

Sample Output

```
22
```

Problem 4

The **longest common subsequence** (or **LCS**) of groups A and B is the longest group of elements from A and B that are common between the two groups and in the same order in each group. For example, the sequences "1234" and "1224533324" have an LCS of "1234".

Input

The first line of input is an integer T representing the number of test cases. Each test case is made up of two strings A and B .

Output

For each test case, output The length of the longest common subsequence.

Sample Input

```
1
1234 1224533324
```

Sample Output

```
4
```

Problem 5

Given a natural number n , what is the least number of moves you need to reduce n to 1? Valid moves are:

- subtract 1.
- divide by 2, applicable if n is divisible by 2.
- divide by 3, applicable if n is divisible by 3.

Input

The first line of input is an integer T representing the number of test cases. Each test case is made up of a single integer n .

Output

For each test case, output the minimum number of moves to reduce n to 1.

Sample Input

1
10

Sample Output

3

Bonus:

Problem 6

Given N as the size of a $N \times N$ Sudoku, check whether you can find a solution of the Sudoku. The Sudoku will be partially filled, and you should continue to fill the rest of the Sudoku. The placed number must be unique on its horizontal and vertical only. A solved Sudoku is when all the rows and columns are filled from 1 to N .

Input

The first line is an integer T representing the number of test cases. Each test case is made up of two integers N and m . Then m lines follow each consisting of three integers n , r , and c where n is the value in the Sudoku and r and c represent the location in the Sudoku.

Output

For each test case, output “yes” if you can fill the Sudoku without violating the rule “no” otherwise.

Sample Input

2
5 9
1 0 0
2 1 1
3 2 2
4 3 3
5 4 4
1 2 1
3 3 1
5 0 3
1 1 2
3 3
3 1 0
2 2 0
1 2 1

Sample Output

no
yes