

# CSE 312 Midterm II (Lab Exam)

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## I. POWER OF NUMBERS (20 POINTS)

Write a program that takes as input a number  $N$  and determines whether it is a square, that is, whether it can be written as  $q^2$  for some integer  $q$ . Your program should run in time  $O(\log n)$ .

### A. Input

The first line of the input consists of a single integer  $T$  giving the number of test cases to follow. Then each test case contains the integer  $N$ .

### B. Sample Input

```
4
250
225
15129
72
```

### C. Output

For each line of input generate a line of output. If  $N$  is square, write the square root of the number  $N$ , otherwise write 'Not square'.

### D. Sample Output

```
Not square
15
123
Not square
```

## II. DUPLICATES (20 POINTS)

You are given an array of  $n$  elements, and you notice that some of the elements are duplicates; that is, they appear more than once in the array. Write a program that removes all duplicates from the array in time  $O(n \log n)$ .

### A. Input

The first line of the input consists of a single integer  $N$  giving the size of the array. Second line consists of the array elements.

### B. Sample Input

```
20
5 4 5 2 4 5 6 2 5 1 3 5 2 3 5 2 1 5 2 3
```

### C. Output

Write the array with duplicates removed.

### D. Sample Output

```
6 2 3 4 1 5
```

## III. TWO COLOR PROBLEM (20 POINTS)

Write a program that finds if an undirected graph  $G$  can be colored with just two colors so that no two adjacent vertices are in the same color.

### A. Input

The first line of the input consists of two numbers,  $V$ ,  $E$ , number of vertices and number of edges in the graph respectively. Then each input line contains two numbers  $i$ ,  $j$  where there is an edge between nodes  $i$  and  $j$ .

### B. Sample Input

```
4 3
1 2
1 3
1 4
```

### C. Output

If the graph can be colored, display 'Yes, it can be colored', if it can not, display 'No, it can not be colored'.

### D. Sample Output

```
Yes, it can be colored
```