Day 25: Running Time and Complexity

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Tutorial | Problem | Submissions | Leaderboard | Discussions | Editorial

Objective

Today we're learning about running time! Check out the Tutorial tab for learning materials and an instructional video!

Task

A *prime* is a natural number greater than 1 that has no positive divisors other than 1 and itself. Given a number, n, determine and print whether it's **Prime** or **Not prime**.

Note: If possible, try to come up with a $O(\sqrt{n})$ primality algorithm, or see what sort of optimizations you come up with for an $O(n)$ algorithm. Be sure to check out the *Editorial* after submitting your code!

Input Format

The first line contains an integer, T, the number of test cases.
Each of the T subsequent lines contains an integer, n, to be tested for primality.

Constraints

- $1 \leq T \leq 30$
- $1 \leq n \leq 2 \times 10^9$

Output Format

For each test case, print whether n is **Prime** or **Not prime** on a new line.

Sample Input

```
3
12
5
7
```

Sample Output

```
Not prime
Prime
Prime
```

Explanation

Test Case 0: $n = 12$.
12 is divisible by numbers other than 1 and itself (i.e.: 2, 3, 6), so we print **Not prime** on a new line.

Test Case 1: $n = 5$.
5 is only divisible 1 and itself, so we print **Prime** on a new line.

Test Case 2: $n = 7$.
7 is only divisible **1** and itself, so we print **Prime** on a new line.

Medium Submitted 23995 times
Max Score **30**

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Suggest Edits

Current Buffer (saved locally, editable) Java 8

```
1  import java.util.Scanner;
2
3  public class Solution {
4
5      static boolean isPrime(int n) {
6          //check if n is a multiple of 2, knowing if even nums are prime is trivial
7          if (n % 2 == 0) return false;
8          //then check the odds
9          for (int i = 3; i * i <= n; i += 2) {
10             if (n % i == 0)
11                 return false;
12         }
13         return true;
14     }
15
16     public static void main(String[] args) {
17
18         Scanner sc = new Scanner(System.in);
19         int input = sc.nextInt();
20
21         int[] nums = new int[input];
22         for (int i = 0; i < input; i++) {
23             nums[i] = sc.nextInt();
24         }
25         sc.close();
26
27         for (int i :
28                 nums) {
29             if (isPrime(i)) {
30                 System.out.println("Prime");
31             } else {
32                 System.out.println("Not prime");
33             }
```

```
        }

    }
}

```

Line: 38 Col: 1

Upload Code as File | Test against custom input | Run Code | Submit Code

Testcase 0 ✔ | Testcase 1 ✔

Congratulations, you passed the sample test case.

Click the **Submit Code** button to run your code against all the test cases.

Input (stdin)

```
3
12
5
7
```

Your Output (stdout)

```
Not prime
Prime
Prime
```

Expected Output

```
Not prime
Prime
Prime
```