

Alice and Bob's Silly Game ■



Problem	Submissions	Leaderboard	Discussions	Editorial

Alice and Bob invented the following silly game:

- The game starts with an integer, n, that's used to build a **set** of n distinct integers in the inclusive range from 1 to n (i.e., $set = \{1, 2, 3, \dots, n-1, n\}$).
- Alice always plays first, and the two players move in alternating turns.
- During each move, the current player chooses a prime number, p, from set. The player then removes p and all of its multiples from set.
- The first player to be unable to make a move loses the game.

Alice and Bob play g games. Given the value of n for each game, print the name of the game's winner on a new line. If Alice wins, print Alice; otherwise, print Bob.

Note: Each player always plays optimally, meaning they will not make a move that causes them to lose the game if some better, winning move exists.

Input Format

The first line contains an integer, g, denoting the number of games Alice and Bob play. Each line i of the g subsequent lines contains a single integer, n, describing a game.

Constraints

- $1 \le g \le 1000$
- $1 \le n \le 10^5$

Subtasks

• $1 \le n \le 1000$ for 50% of the maximum score

Output Format

For each game, print the name of the winner on a new line. If Alice wins, print Alice; otherwise, print Bob.

Sample Input 0

Sample Output 0

Bob Alice Alice

Explanation 0

Alice and Bob play the following g = 3 games:

- 1. We are given n = 1, so $set = \{1\}$. Because Alice has no valid moves (there are no prime numbers in the set), she loses the game. Thus, we print Bob on a new line.
- 2. We are given n = 2, so $set = \{1, 2\}$. Alice chooses the prime number p = 2 and deletes it from the set, which becomes $set = \{1\}$. Because Bob has no valid moves (there are no prime numbers in the set), he loses the game. Thus, we print Alice on a new line.
- 3. We are given n = 5, so $set = \{1, 2, 3, 4, 5\}$. Alice chooses the prime number p = 2 and deletes the numbers 2 and 4 from the set, which becomes $set = \{1, 3, 5\}$. Now there are two primes left, 3 and 5. Bob can remove either prime from the set, and then Alice can remove the remaining prime. Because Bob is left without a final move, Alice will always win. Thus, we print Alice on a new line.



```
C#
 Current Buffer (saved locally, editable) &
                                                                                                                             Ö
1 using System;
2 using System.Collections.Generic;
3
   using System.IO;
4 using System.Linq;
5 ▼ class Solution {
6
7
         static int SieveOfEratosthenes(int n)
8 •
            {
9
                // Create a boolean array "prime[0..n]" and initialize
10
                // all entries it as true. A value in prime[i] will
                // finally be false if i is Not a prime, else true.
11
                bool[] prime = new bool[n + 1];
12
                //memset(prime, true, sizeof(prime));
13
                for (int i = 0; i < prime.Length; i++)</pre>
14
15 ▼
                {
16
                     prime[i] = true;
17
                }
18
19
                for (int p = 2; p * p <= n; p++)
20 ▼
                     // If prime[p] is not changed, then it is a prime
21
22
                     if (prime[p] == true)
23 ▼
                     {
24
                         // Update all multiples of p
25
                         for (int i = p * 2; i <= n; i += p)
                             prime[i] = false;
26
27
                     }
28
                }
29
                // Print all prime numbers
30
31
                int primos = 0;
32
                for (int p = 2; p <= n; p++)
33 ▼
                {
34
                     if (prime[p])
35 ▼
                         //Console.Write(p + " ");
36
37
                         primos++;
38
```

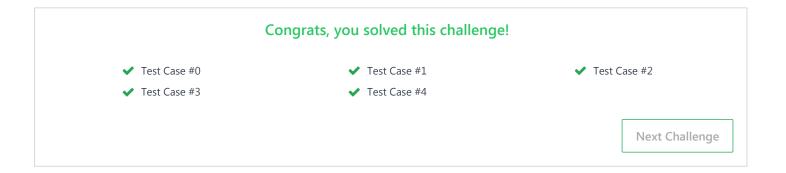
```
40
                return primos;
41
            }
42
43
            static void Main(string[] args)
44 🔻
45
46
47
               // int N = 13;
48
               // SieveOfEratosthenes(N);
49
50
                int g = Convert.ToInt32(Console.ReadLine());
51
                for (int a0 = 0; a0 < g; a0++)
52 ▼
                    int n = Convert.ToInt32(Console.ReadLine());
53
54
                    // your code goes here
55
56
                    int primos = SieveOfEratosthenes(n);
                    if (primos % 2 == 1) Console.WriteLine("Alice");
57
                    else Console.WriteLine("Bob");
58
59
60
                Console.ReadLine();
61
            }
62
63
64
65
66
   }
67
                                                                                                                  Line: 62 Col: 1
```

1 Upload Code as File

Test against custom input

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