# Alice and Bob's Silly Game

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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., $set = \{1, 2, 3, \ldots, n-1, n\}$).
- 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**

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

**Subtasks**

- $1 \leq n \leq 1000$ 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**

```
3
1
2
5
```

**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.



Current Buffer (saved locally, editable) C#

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
class Solution {

    static int SieveOfEratosthenes(int n)
       {
            // Create a boolean array "prime[0..n]" and initialize
            // all entries it as true. A value in prime[i] will
            // finally be false if i is Not a prime, else true.
            bool[] prime = new bool[n + 1];
            //memset(prime, true, sizeof(prime));
            for (int i = 0; i < prime.Length; i++)
            {
                prime[i] = true;
            }

            for (int p = 2; p * p <= n; p++)
            {
                // If prime[p] is not changed, then it is a prime
                if (prime[p] == true)
                {
                    // Update all multiples of p
                    for (int i = p * 2; i <= n; i += p)
                        prime[i] = false;
                }
            }

            // Print all prime numbers
            int primos = 0;
            for (int p = 2; p <= n; p++)
            {
                if (prime[p])
                {
                    //Console.Write(p + " ");
                    primos++;
                }
            }
```

```
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              {
53                  int n = Convert.ToInt32(Console.ReadLine());
54                  // your code goes here
55
56                  int primos = SieveOfEratosthenes(n);
57                  if (primos % 2 == 1) Console.WriteLine("Alice");
58                  else Console.WriteLine("Bob");
59              }
60              Console.ReadLine();
61          }
62
63
64
65
66  }
67
```

Line: 62 Col: 1

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

## Congrats, you solved this challenge!

- ✔ Test Case #0
- ✔ Test Case #1
- ✔ Test Case #2
- ✔ Test Case #3
- ✔ Test Case #4

Next Challenge