

How to check if a given number is Fibonacci number?

Given a number 'n', how to check if n is a Fibonacci number.

A simple way is to **generate Fibonacci numbers** until the generated number is greater than or equal to 'n'. Following is an interesting property about Fibonacci numbers that can also be used to check if a given number is Fibonacci or not.

*A number is Fibonacci if and only if one or both of $(5*n^2 + 4)$ or $(5*n^2 - 4)$ is a perfect square* (Source: [Wiki](#)). Following is a simple program based on this concept.

```
// C++ program to check if x is a perfect square
#include <iostream>
#include <math.h>
using namespace std;

// A utility function that returns true if x is perfect square
bool isPerfectSquare(int x)
{
    int s = sqrt(x);
    return (s*s == x);
}

// Returns true if n is a Fibonacci Number, else false
bool isFibonacci(int n)
{
    // n is Fibonacci if one of 5*n*n + 4 or 5*n*n - 4 or both
    // is a perfect square
    return isPerfectSquare(5*n*n + 4) ||
           isPerfectSquare(5*n*n - 4);
}

// A utility function to test above functions
int main()
```

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```

{
    for (int i = 1; i <= 10; i++)
        isFibonacci(i)? cout << i << " is a Fibonacci Number \n":
                        cout << i << " is a not Fibonacci Number \n" ;

    return 0;
}

```

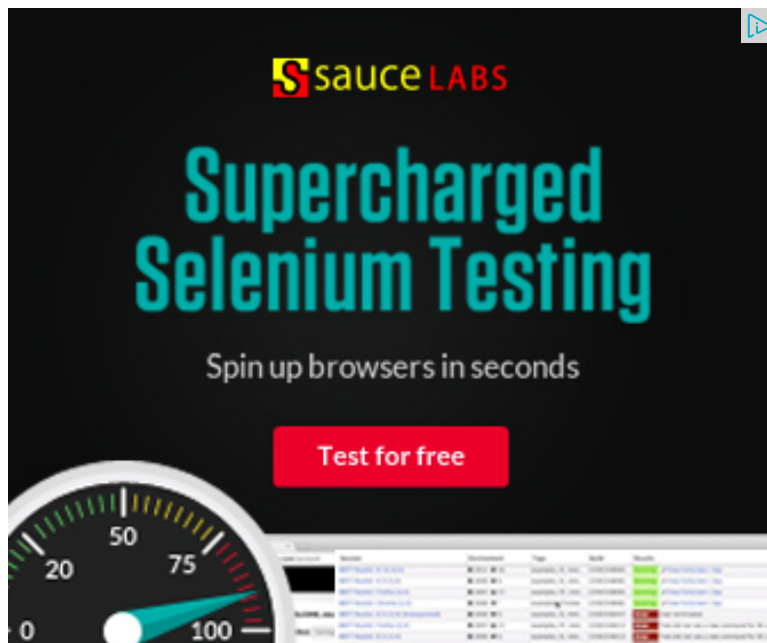
Output:

```

1 is a Fibonacci Number
2 is a Fibonacci Number
3 is a Fibonacci Number
4 is a not Fibonacci Number
5 is a Fibonacci Number
6 is a not Fibonacci Number
7 is a not Fibonacci Number
8 is a Fibonacci Number
9 is a not Fibonacci Number
10 is a not Fibonacci Number

```

This article is contributed by **Abhay Rathi**. Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above



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