CS401_Lab 5

This lab is to be completed individually.

This lab is for you to understand recursion.

What to do?

Part-1

Jacobsthal number are an integer sequence named after Ernst Jacobsthal. The sequence starts at 0 and 1, then each following number is found by adding the number before it to twice the number before that. It follows the below function:

$$J_n = \begin{cases} 0 & \text{if } n = 0 \\ 1 & \text{if } n = 1 \\ \text{Jn-1 + 2Jn-2} & \text{if } n > 1 \end{cases}$$

The first few numbers in the sequence are:
0, 1, 1, 3, 5, 11, 21, 43, 85, 171, 341, 683, 1365, 2731, ... Write a Java program that contains the following functions:

```
long Jacobsthal_recursive(int n)

long Jacobsthal_iterative(int n)
```

Program Input:

Your Program should accept an integer “n”(Ex - 10) from the user.

Program Output:

You program should print the first “n” numbers of the Jacobsthal sequence

```
<terminated> Jacobsthal [Java Application] /Library/Java/JavaVirtualMachines/jdk-21.jd
Enter the value of n: 10
Recursive version: 0, 1, 1, 3, 5, 11, 21, 43, 85, 171, 341
Time taken to execute recursive version: 0.35 millisecond
Iterative version: 0, 1, 1, 3, 5, 11, 21, 43, 85, 171, 341
Time taken to execute iterative version: 0.19 millisecond
```

Part-2

Write a recursive method that returns the largest value in the first size elements of an array The signature of the method is:

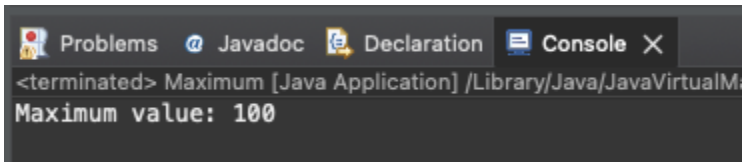
```
int maximum(int A[], int size)
```

Here is some framework to get you started:

```
public class Maximum {
public static int maximum(int A[], int size) {

// Fill in code

}

public static void main(String args[])

{ int A[] = {10, -20, 1, 2, 0, 5, 100};

int s = maximum(A, A.length);

System.out.println(s); }

}
```

Make sure that your code is well documented i.e., in-line comments with a simple README would be ideal. For instance, every function and complex portion of code should have comments that describe what it does.

Program Output:



What to turn in?

1. Source code .java files for both the programs

2. Your program's outputs in a PDF file

3. JAR file.

4. README file to demonstrate how your program works. Include a command to determine how to run the JAR file.

Please submit on Blackboard before the assigned due date