COSC 501

Lab 12

(50 points)Program 1: Linked List

The following program creates a linked list with three names:

```cpp
#include <iostream>
#include <string>
using namespace std;

struct Node
{
    string name;
    Node *link;
};

typedef Node* NodePtr;

int main()
{
    NodePtr listPtr, tempPtr;
    listPtr = new Node;
    listPtr->name = "Emily";

    tempPtr = new Node;
    tempPtr->name = "James";
    listPtr->link = tempPtr;

    tempPtr->link = new Node;
    tempPtr = tempPtr->link;
    tempPtr->name = "Joules";
    tempPtr->link = NULL;

return 0;
}
```

Add code to the main function that:

a. Outputs in order all names in the list.

b. Inserts the name "Joshua" in the list after "James" then outputs the modified list.

c. Deletes the node with "Joules" then outputs the modified list.

d. Deletes all nodes in the list.

(25 points)Program 2: Recursion 1

Write a recursive function definition for a function that has one parameter n of type int and that returns the *n*-th Fibonacci number. The Fibonacci numbers F_n are defined as follows. F_0 is 1, F_1 is 1 and

$$F_{i+2} \; = \; F_i \; + \; F_{i+1}$$

where i = 0, 1, 2, … .

In other words, each number is the sum of the previous two numbers. The first few Fibonacci numbers are 1, 1, 2, 3, 5, and 8. Embed the function in a program and test it.

(25 points)Program 3: Recursion 2

Write a recursive function definition for a function that has one parameter n of type int and that returns the factorial of *n*.

The factorial function n! is defined by

$$n! = \; 1 \times 2 \times 3 \times 4 \times ... \times n$$

Embed the function in a program and test it.
(*Assume that 0! = 1)