Program Set 5

Dates: 12.12.2022 – 16.12.2022

NOTE: GIVE PROPER COMMENTS, PROMPTS AND CUES FOR ALL CODES.

1. Write a program to find the sum of N natural numbers. Take user input and print out result from main().
    a. Without using recursion
    b. Using recursion – use call by value
    c. What is the stopping condition? Try to draw the recursion tree (steps of recursion) for N=5 and explain what is happening.
2. A 5-digit positive integer is entered through the keyboard. Take user input and print out result from main(). Write a function to calculate sum of digits of the 5-digit number.
    a. Without recursion.
    b. With recursion
3. Print the first N terms of the Fibonacci series
    a. Using recursion.
    b. Without using recursion
4. Write a function to compute the distance between two points and use it to develop another function that will compute the area of the triangle whose vertices are A(x1, y1), B(x2, y2), and C(x3, y3). Use these functions to develop a function which returns a value 1 if the point (x, y) lies inside the triangle ABC, otherwise a value 0.
5. Print all the alphabets from A-Z using an integer variable as counter in a for loop.
6. Write a program in C to find the Factorial of a number using recursion.
7. Write a program in C to convert a decimal number to binary using recursion.
8. Write a program in C to calculate the power of any number using recursion.

Worked out example code for recursive function for problem 1

```c
#include <stdio.h>
int recSum(int x)  //recursive function definition
{
    if (x <= 1)
        return x;
    else
        return x + recSum(x - 1);
}
int main()
{
    int n = 5, ans; //sum of first 5 natural numbers
    ans = recSum(n); //calling recursive function
    printf("The sum of the first %d natural numbers = %d",n,ans);
    return 0;
}
```

Worked out example code for recursive function for problem 2

```c
#include <stdio.h>
int sum_of_digits(int n) //recursive function definition
{
    if (n == 0)
        return 0;
    else
        return (n % 10 + sum_of_digits(n / 10));
}
int main()
{
    int num = 123;
    int result = sum_of_digits(num); //function call
    printf("Sum of digits in %d is %d\n", num, result);
    return 0;
}
```