Practice 03 (17-03-2021)

Recursion III (Relatively Simple Problems)

Write recursive function for the following problems

1. Write a recursive method that for a positive integer returns a string with commas in the appropriate places, for example, putCommas(1234567) returns the string "1,234,567."

2. Write a recursive method to print a Syracuse sequence that begins with a number n_0 and each element n_i of the sequence is n_{i-1} /2 if ni-1 is even and $3n_{i-1}$ + 1 otherwise. The sequence ends with 1.

3. Write a recursive method that uses only addition, subtraction, and comparison to multiply two numbers.

4. Write a recursive function to compute the binomial coefficient according to the definition:

$$\binom{n}{k} = \begin{cases} 1 & if\ k = 0\ or\ k = n \\ \binom{n-1}{k} + \binom{n}{k-1} & otherwise \end{cases}$$

5. Write a recursive function to add the first n terms of the series:

$$1 + \frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \frac{1}{6} \ldots.$$

6. Write a recursive function GCD(n,m) that returns the greatest common divisor of two integers n and m according to the following definition:

$$GCD(n,m) = \begin{cases} m & if\ m \leq n\ and\ n\ mod\ m = 0 \\ GCD(m,n) & if\ n < m \\ GCD(m, n\ mod\ m) & otherwise \end{cases}$$

7. Give a recursive version of the following function:

```
void cubes(int n) {
     for (int i = 1; i <= n; i++)
          cout << i * i * i << ’’;
}
```