Algorithm Lab 1

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1 Pre-Requisite in C++

1. Pointer

2. Array 1D/2D - Dynamic memory allocation

3. Function / Recursive function

4. Function arguments and return type

2 Warm up problem

1. Fibonacci

2. Factorial

3. Prime number

4. Find second largest number in List

5. Euclid's algorithm for GCD

Algorithm 1 Fibonacci

1: **procedure** Fibonacci(n)
2:     **if** $n \leq 1$ **then**
3:         **return** n
4:     **else**
5:         **return** Fibonacci($n-1$)+Fibonacci($n-2$)
6:     **end if**
7: **end procedure**

Algorithm 2 Factorial

1: **procedure** FACTORIAL(n)
2:     **if** $n \leq 0$ **then**
3:         **return** 1
4:     **else**
5:         **return** n*FACTORIAL($n-1$)
6:     **end if**
7: **end procedure**

Algorithm 3 Euclid's algorithm

1: **procedure** EUCLID(a, b)   ▷ The g.c.d. of a and b
2:     $r \leftarrow a \bmod b$
3:     **while** $r \neq 0$ **do**   ▷ We have the answer if r is 0
4:         $a \leftarrow b$
5:         $b \leftarrow r$
6:         $r \leftarrow a \bmod b$
7:     **end while**
8:     **return** b ▷ The gcd is b
9: **end procedure**

Algorithm 4 Euclid's algorithm

1: **procedure** GCD(n, m)
2:     **if** $n = m$ **then**
3:         **return** m
4:     **else if** $n \geq m$ **then**
5:         **return** GCD($n-m, m$)
6:     **else**
7:         **return** GCD($n, m-n$)
8:     **end if**
9: **end procedure**