60-266 – Assignment #5

DUE DATE is: *Friday, March 30, 2018.* To be submitted via Blackboard by Midnight.

WARNINGS: You must only use instructions and directives discussed in Lectures 1 to 11.

Programming Exercise 1 (30 points): [call it Ass5-Q1.asm]

The greatest common divisor (GCD) of two integers X and Y is the largest integer Z that will evenly divide both integers. The GCD algorithm involves integer division in a loop.

Write the recursive GCD function in ASM. Your main program must call this function with 32-bit unsigned parameters X and Y. GCD function should return the value Z (GCD of X and Y) in register EAX, and the main program should display this value Z.

Your main calls you're the recursive GCD procedure 5 times, using the following pairs (5, 20), (24, 18), (11, 7), (432, 226), (0, 0). After each procedure call, main displays the GCD of the input pair.

The pseudocode of the recursive GCD algorithm is given below.

```
function gcd(a, b)
    if b = 0
       return a;
    else
       return gcd(b, a mod b);
```

Programming Exercise 2 (30 points): [call it Ass5-Q2.asm]

Write an iterative (that is, a non-recursive) procedure for calculating the factorial of an integer number N. Also, you should write a MAIN procedure that calls the factorial procedure with parameter N, and display the result.

Programming Exercise 3 (30 points): [call it Ass5-Q3.asm]

Write an ASM program that reads an integer N and then displays the first N values of the Fibonacci number sequence, described by:

Fib(0) = 0, Fib(1) = 1, Fib(N) = Fib(N-2) + Fib(N-1)

Thus, if the input is N = 10, your program Ass4-Q1.exe should display the following single line:

Fibonacci sequence with N = 10 is: 0 1 1 2 3 5 8 13 21 34 55.

Your MAIN program should call a recursive Fib procedure with parameter k, and the Fib procedure should return the k-th Fibonacci number in register EAX, and then the MAIN program should display the k-th Fibonacci number in the sequence.

You may want to declare the Fibonacci sequence as an array of maximum size 10, and have the Fib procedure to compute the value of each cell of the array. Also, there are other ways to do this.