**MS Comprehensive Exam**

**CSCI 532, Spring 2023** **NAME: CWID:**

**Q.1. [20 pts]** Consider the following algorithm:

int f(n)

/\* n is a positive integer \*/

if (n <=3) return n

int sum = f(n-1)

if (n is even)

return sum + f(n-2)

else return sum + f(n-3)

Trace execution of **f(6)** by drawing the **recursion tree.** Show all function calls (callers and called functions), and intermediate results; and show what f(6) returns. Make sure that you draw all subtrees even if some are identical.

You can work on paper and submit an image of it.

**Q.2. [20 pts]**

Consider the following algorithm:

int f(n)

/\* n is a positive integer \*/

if (n <=3) return n

int sum = f(n-1)

if (n is even)

return sum + f(n-2)

else return sum + f(n-3)

Develop a **dynamic programming** algorithm that calculates and returns the same value of f(n) for any given integer n>=1. That is, develop a dynamic programming algorithm equivalent to the recursive algorithm f(n). Describe your algorithm using C++ syntax.

You can work on paper and submit an image of it.