**CS 121 Week 16 Worksheet - Recursion**

**Questions:**

1. What is recursion? Give a real-life example of it.
2. Is a recursive solution generally a better approach than an iterative (loop-structure) solution? Explain your answer.
3. Answer each part for the given math function:

where

EXAMPLE:

1. Identify the base case and recursive case
2. Create an iterative solution (in the form of a C++ function) for the math function. You can implement it any way you want (although the more efficient the solution the better).
3. Create a recursive solution (in the form of a C++ function) for the math function. You can implement it any way you want (although the more efficient the solution the better).
4. Give a trace diagram of each of your solutions for the input n = 5.
5. Answer each part given the following factorial function and initial conditions:

, where

EXAMPLE:

1. Identify the base case and recursive case
2. Create an iterative solution (in the form of a C++ function) for the factorial function. You can implement it any way you want (although the more efficient the solution the better).
3. Create a recursive solution (in the form of a C++ function) for the factorial function. You can implement it any way you want (although the more efficient the solution the better).
4. Give a trace diagram of each of your solutions for input n = 5.
5. Answer each part given the Fibonacci function and initial conditions:

where

EXAMPLE SEQUENCE: 0, 1, 1, 2, 3, 5, 8, 13...

(n-order is 0, 1, 2, 3, 4, 5, 6, 7, ...)

1. Identify the base case and recursive case
2. Create an iterative solution (in the form of a C++ function) for the Fibonacci function. You can implement it any way you want (although the more efficient the solution the better).
3. Create a recursive solution (in the form of a C++ function) for the Fibonacci function. You can implement it any way you want (although the more efficient the solution the better).
4. Give a trace diagram of each of your solutions with the input n = 4.