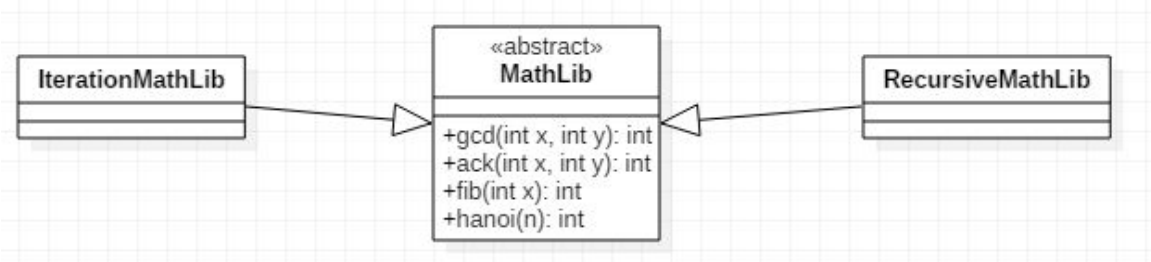
University of Technology, Jamaica
School of Computing and Information Technology
Data Structures
CMP2006
Lab Assignment 2

Please complete and submit to the following URL:
http://bit.ly/ds-2019-20-sem1-weekly-assessments

Implement the solution using the following UML diagram (no namespaces/package names should be used). NB. All methods in the MathLib class are abstract.



The mathematical definitions for the respective function are included below.

Part 1 (Greatest Common Divisor):

$$GCD(x,\ y) = \begin{cases} x & y=0 \\ GCD(y,\ x \bmod y) & x \geq y, x \neq 0 \end{cases}$$

Part 2 (Ackermann's function):

$$Ack(x,\ y) = \begin{cases} y+1 & x=0 \\ Ack(x-1,\ 1) & y=0 \\ Ack(x-1,\ Ack(x,\ y-1)) & x \neq 0,\ y \neq 0 \end{cases}$$

Part 3 (Fibonacci):

$$Fib(x) = \begin{cases} 0 & \text{if } x=0 \\ 1 & \text{if } x=1 \\ Fib(x-1) + Fib(x-2) & \text{if } x>1 \end{cases}$$

Part 4 (Tower of Hanoi Problem):

$$hanoi(n) = \begin{cases} 1 & n=1 \\ 2xhanoi(n-1)+1 & n>1 \end{cases}$$

Write a main method to demonstrate the use of all functions (iteratively and recursively) with sample values.

Mark Scheme (5 marks)
4 marks for implementing all algorithms correctly (iteratively and recursively 0.5 mark each)
1 mark explanation (given in class on a random problem chosen)