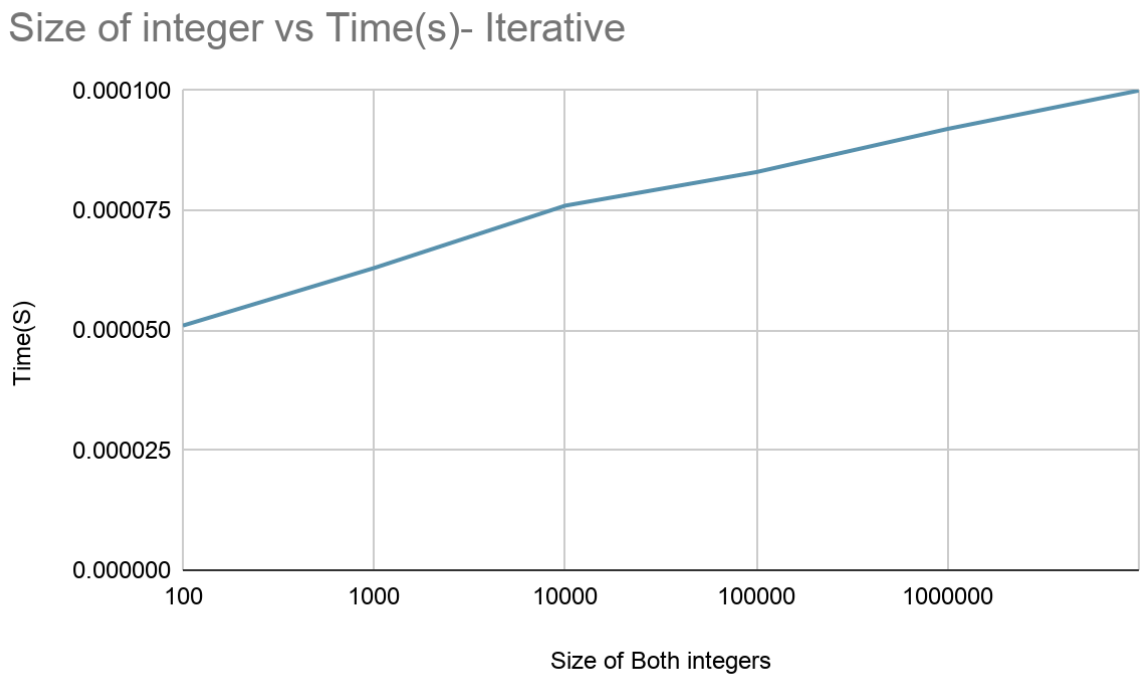
Assignment 2 Analysis

For this assignment I wrote 2 versions of the russian peasants algorithm using iteration and recursion. The functions were implemented using BigIntegers to allow the use of large integers without integer overflow.

Iterative approach:

The iterative approach is written where the size of the integer given is halved every time provided it is not odd. As such we can assume that the time complexity of this algorithm is logarithmic,employing the same methods seen in divide and conquer.

Elapsed Time	Values of both integers
0.000051	100
0.000063	1000
0.000076	10000
0.000083	100000
0.000092	1000000
0.0001	10000000

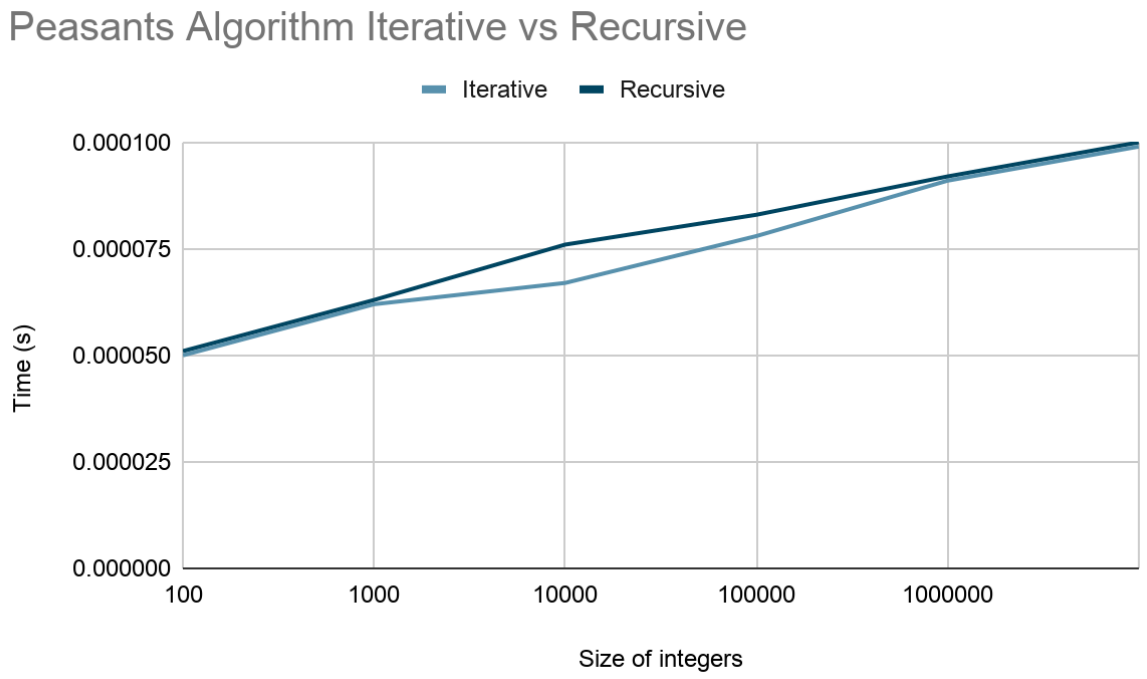


As seen I used a logarithmic scale here which produces a straight line result once again reinforcing the fact that this is a O(logN) time complexity. I displayed it this way just for scaling issues when scaled normally.

Recursive approach:

The recursive approach was implemented more or less the same way as the iterative approach, we can infer from this that it is once again a logarithmic time complexity as our function call size is halved every time.

Elapsed Time	Values of both integers
0.000050	100
0.000062	1000
0.000067	10000
0.000078	100000
0.000091	1000000
0.000099	10000000



Comparing the two algorithms shows there isn't much redundancy in the recursive approach compared to something like a recursive version of fibonacci sequence.
The time complexity between both is O(logn) while there is some difference between the 2 approaches that is mainly due to hardware and wrapping times with bigInts.