Lab W1D1

Question 1. Comparing Algorithms.

In this lab, you will be solving the same problem using three different algorithms. Your job is to

Implement all three algorithms in Java 8. If you have another algorithm, that must be numbered 4 and so on.

Collect the data on "time required" to solve the problem for different problem sizes : 1000, 2000, 3000, 4000, …, 10000. Your "input data" must be generated using a random number generator.

Prepare one graph to compare the performance of three algorithms.

Write a summary report with your observations and conclusions.

Problem statement.

Find the largest **distance** between any two even integers in an integer array. Note that the distance between 8 and 2 is 6. Further, the distance between 2 and 8 is also 6.

Algorithm 1.

Create a **new array** consisting of even numbers only. Then use nested loops to solve the problem using the newly created array of even numbers only.

Algorithm 2.

Use a nested loop to solve the problem **without creating an extra array**.

Algorithm 3.

Use one loop. Find max and min of even integers. Compute max – min. Please compute max and min and please do not use Math Library.

Question 2. Proof by Induction

Let F(n) denote the nth Fibonacci number. Prove $F(n) > (4/3)^n$ for $n > 4$.

Hints: Use the fact F(n) = F(n-1) + F(n-2). Since you are using two values, you must prove the two base cases: n = 5 and n = 6.

THINGS TO SUBMIT: Java programs/projects and one word document. Please do not submit any compressed files. This will be the rule for all Labs. Only one person from the group needs to submit.

Thanks! Have a great evening!! Have fun!!!