Homework 1 – CPSC 4100-01 , Winter 2017

Due: Jan. 11th, 2017 – 11:59 PM

Please put this statement on top of the first page:

"I have not received unauthorized aid on this assignment. I understand the answers that I have submitted. The answers submitted have not been directly copied from another source, but instead are written in my own words."

It is important that your work is clearly presented. This will enable me to return your work more quickly.

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1) Select a data structure that you have seen previously, and discuss its strengths and limitations. [CLRS 1.1-3]

10 points

2) Suppose we are comparing implementations of insertion sort and merge sort on the same machine. For inputs of size n, insertion sort runs in $8n^2$ steps, while merge sort runs in $64n \lg n$ steps. For which values of n does insertion sort beat merge sort? [CLRS 1.2-2]

10 points

3) Let F_i represents the i-th Fibonacci number ($F_0 = F_1 = 1$). Prove that for all values of $N \geq 3$, the following equation is true using induction:

$$\sum_{i=1}^{N-2} F_i = F_N - 2$$

15 points

4) Prove that the following equation is correct for all values of $N \geq 1$:

$$\sum_{i=1}^{N} (2i - 1) = N^2$$

15 points