ICS/CSE 46 Summer 2016

Homework 2

Due 7/8 in class

Name: ____________________________

Student ID Number: ________________

Please list any collaborators here:

This homework is out of 10 points and graded for completion. Working together on a homework is okay, copying answers is not. Some homeworks will include challenge extra credit problems that will be worth 2 points each.

1. Show that if \( f(n) \) is \( O(g(n)) \) then \( g(n) \) is \( \Omega(f(n)) \).

2. List several reasons you might choose to use a \( \Theta(n \log n) \) time algorithm over a \( \Theta(n) \) time algorithm for the same task.

3. The array based list described in class has a flaw. If a large number of elements are inserted and then all removed, the underlying array will still be large even though there are no elements in the list. This problem can be fixed by copying into a smaller array when the number of elements goes below a threshold. In terms of \( n \) the number of elements currently in the list and \( N \) the size of the underlying array, when should a new smaller array be created and how big should it be?

Extra credit: Prove a lower bound on the time of any comparison based search algorithm for sorted lists. That is show that any algorithm that takes as input a sorted list and an element and outputs the index of the element in the list (if it appears) must take a certain number of steps.