

Homework 1

Due: 5:00pm, January 30, 2009

Total Points: 30

You may submit your solution via email to holder@wsu.edu (preferred), or you may submit hardcopy in class or to my office (EME 227) by the above deadline. If you submit via email, please use PDF or other common electronic format.

1. (6 points) Exercise 2.6, page 64 of Weiss. For part (b), give a precise expression for the number of days (not a Big-Oh expression). Hint: Use floor or ceiling.
2. (6 points) Use mathematical induction to prove your formula for part (a) of Problem 1.
3. (6 points) Write an efficient iterative (i.e., loop-based) function *Fibonacci*(n) that returns the n th Fibonacci number. Your function may only use a constant amount of memory (i.e., no auxiliary array). Argue that the running time of the function is $\Theta(n)$, i.e., linear in n .
4. (12 points) Write an efficient recursive function called *IndexEqual*(A, i, j) that returns true if there exists an index x ($i \leq x \leq j$) such that $A[x] = x$; otherwise, returns false. You may assume A is sorted integer array in which every element is unique.
 - a. What is the situation resulting in the best-case running time of your function, and give a Θ expression for that running time?
 - b. What is the situation resulting in the worst-case running time of your function, and give a Θ expression for that running time in terms of n , where $n = j - i + 1$?