CS483 - Homework 1 (due Sept 15)

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Chapter 1 and 2

1. (3) (Show that for any real constants a and b , where $b > a$

$$(n + a)^b = \Theta(n^b)$$

2. (3) Show using definition of Θ that $\frac{1}{2}n^2 - 5n = \Theta(n^2)$

3. (5) For the following pair of functions indicate whether $f(n)$ is $\mathcal{O}, \Omega.\Theta$ of $g(n)$:

   n^k, c^n
   $2^n, 2^{n/2}$
   $n^3, \log^2 n$

4. (4) Chapter 1, Problem 1, Problem 2

5. (5) Chapter 2, Problem 1 a, d

6. (5) Chapter 2, Problem 2 b, e

7. (5) Consider sorting n numbers stored in an array A by first selecting the smallest element and exchanging it with $A[1]$. The finding a second smallest element and exchanging it with $A[2]$, an continue for the first (n-1) elements in the array. Write pseudocode for this algorithm and give the best case and worst-case running time.

Practice Problems (not for grade)

1. Chapter 1, Problem 4

2. Chapter 2, Problem 3