CS 361, HW1

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You are encouraged to work with people in your group on this homework. You are also free to ask a friend for help, or use any book or the web as a resource. *However, you must write up the work yourself.*

If you have an older version of the book, check with a friend to make sure you get the right numbers for exercises (the numbers are different for the first and second editions)

1. CLRS Exercise 3.1-4: a) Is $2^{n+1} = O(2^n)$? b) Is $2^{2n} = O(2^n)$? Justify your answers.

2. Exercise 1.2-2

3. Exercise 1.2-3

4. Problem 1-1

5. Using Figure 2-2 as a model, illustrate the operation of Insertion-Sort on the array $A = \{6, 2, 3, 8, 10, 1\}$

6. Ex 2.1-3

7. Problem 2-2 (all 4 parts)

8. For each of the following, say whether or not a function $f(n)$ exists which meets the constraints. If a function exists, give an example of such a function. (You may find it useful to refer to the precise definition of O,o, Ω, etc given in lecture and in the book!)

   (a) $f(n) = o(n^2)$ and $f(n) = \Omega(n)$
   (b) $f(n) = o(n \log n)$ and $f(n) = \omega(n)$
   (c) $f(n) = o(1)$
   (d) $f(n) = O(\log^2 n)$ and $f(n) = \Theta(\log^2 n)$

(e) $f(n) = \Theta(\log^{100} 10n^5)$ and $f(n) = \Theta(\log n)$

(f) $f(n) = \Theta(\log^2 n^5)$ and $f(n) = \Theta(\log_{10}^2 100n)$

(g) $f(n) = O(n^{10 \log n})$ and $f(n) = \Omega(2^{\log^2 n^{10}})$