15-451 Algorithms, Fall 2003

Mini # 1 **due: midnight September 2, 2003**

This mini is due via *email* to your TA, by midnight Tuesday Sept 2. Please use the subject line "15-451 MINI #1" in your email.

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1. An algorithm to factor positive integers takes as input a number N and outputs the prime factorization of N. Q: What is n, the size (length) of the input, as a function of N?

2. For a pair of functions f and g, is it possible to have $f(n) = o(g(n))$ and $f(n) = \Theta(g(n))$? Why or why not?

3. For each pair $\langle f, g\rangle$ of functions below, list which of the following are true: $f(n) = o(g(n))$, $f(n) = \Theta(g(n))$, or $g(n) = o(f(n))$.

   (a) $f(n) = 100n^2, \quad g(n) = n^3.$

   (b) $f(n) = (\lg n)^{\lg n}, \quad g(n) = n^{\lg\lg n}.$

   (c) $f(n) = 2^n, \quad g(n) = 4^n.$