CSE 312 Midterm I (Exam in Class)

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I. Algorithm Complexity

In each of the following situations, indicate whether f = O(g) or g = O(f) or both (in which case f = Θ(g)).

f(n)	g(n)
n - 100	n - 200
$100n + \log n$	$n + (\log n)^2$
$\sqrt{n}$	$(\log n)^3$
$n2^n$	3^n
$n!$	2^n
2^n	2^{n+1}
$n^{0.1}$	$(\log n)^{10}$
$n^2/\log n$	$n(\log n)^2$
$\log 2n$	$\log 3n$
$n^{1/2}$	$n^{2/3}$

II. Fibonacci Numbers

The Fibonacci numbers are given by the recurrence $F_{n+1} = F_n + F_{n-1}$, $F_0 = 0$, $F_1 = 1$. Show that for any $n \geq 1, gcd(F_{n+1}, F_n) = 1$.