[10 points] Prove that if $f(n)$ is a *decreasing function*, then $f(n) = O(1)$. A decreasing function is one such that for any $n_1$ and $n_2$ where $n_1 \leq n_2$, $f(n_1) \geq f(n_2)$.

By the definition that given definition f(n2) $\leq$ f(n1) if n1 $\leq$ n2, or in other words f(greater or equal n) $\leq$ f(lesser or equal n). Therefore letting c = 1 and n0 = 1 it can be shown that f(n) $\leq$ 1(g(n)) for all n $\geq$ n0. Hence f(n) = O(1).

[15 points] Use the *formal definition* of Big-Oh to prove that if $f(n) = O(g(n))$ and $f(n) = \Omega(1)$, then $\lg(f(n)) = O(\lg(g(n)))$.

By the definition of Big-Oh there exist positive constants c and n0 such that f(n) $\leq$ cg(n) for all n $\geq$ n0.

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