CSC225: Lab 3

Big-Oh

A function $T(n)$ is in $O(f(n))$ if there exists an integer n_0 and a constant $c > 0$ such that for all integers $n \geq n_0$, $T(n) \leq cf(n)$.

1. Prove that the function $T(n) = (n+1)^2$ is in $O(n^2)$.

2. The recurrence relation for mergesort is given by $T(n) = 2T(n/2) + an$, $T(1) = b$ where $n = 2^k$ for some $k \geq 0$ and a and b are constants. Find a solution for this recurrence relation and a tight big-oh upper bound.

3. Say $f(n)$ is in $O(g(n))$ and $g(n)$ is in $O(h(n))$. Does this imply $f(n)$ is in $O(h(n))$? If yes, can you prove it?

Big-Omega

A function $T(n)$ is in $\Omega(f(n))$ if there exists an integer n_0 and a constant $c > 0$ such that for all integers $n \geq n_0$, $T(n) \geq cf(n)$.

1. Prove that the function $T(n) = n^2$ is in $\Omega((n+1)^2)$.

2. Prove that the function $T(n) = n^2$ is in $\Omega(n log n)$.