Algorithms: Design and Analysis - CS 412

Problem Set 03: Asymptotic Analysis

1. Explain why the statement, "The running time of algorithm A is at least $O(n^2)$," is meaningless.

2. Prove that the running time of an algorithms if $\Theta(g(n))$ if and only if its worst-case running time is $O(g(n))$ and its best-case running time is $\Omega(g(n))$.

3. Prove that $o(g(n)) \Cap \omega(g(n))$ is the empty set.

4. Show that $k \ln k = \Theta(n) \implies k = \Theta(n/\ln)$.

5. Show that for any real constants a and b, where $b > 0, (n + a)^b = \Theta(n^b)$.