CSC 225: Lab 4

1 Big-Oh Analysis

Based on the definitions of Big-Oh prove the following.

a) $5n^2 + 6n + 12$ is $O(n^3)$

b) If $d(n)$ is $O(f(n))$ and $f(n)$ is $O(g(n))$, then $d(n)$ is $O(g(n))$

c) $\sum_{i=1}^{n} i^2$ is $O(n^3)$

2 Big-Omega and Big-Theta Analysis

Prove the following:

a) $n^3 \log n$ is $\Omega(n^3)$

b) $5n^2 + 6n + 12$ is $\Theta(n^2)$

3 Algorithm

An array A contains $n - 1$ unique integers in the range $[0, n - 1]$; that is, there is one number from this range not in A. Design an $O(n)$-time algorithm for finding the missing number that uses $O(1)$ extra space, i.e. you cannot make a copy of A, which would take $O(n)$ extra space.