Lab 1

1 Hash Tables

2 Dictionary Data Structures

- Unsorted Array
  - Find $O(n)$
  - Insert $O(1)$
  - Delete (After Find) $O(1)$
- Linked List
  - Find $O(n)$
  - Insert $O(1)$
  - Delete (After Find) $O(1)$
- Sorted Array
  - Find $O(\log(n))$
  - Insert $O(n)$
    - Have to move all the elements down the array
  - Delete (After Find) $O(n)$
- Balanced Binary Search Tree
  - Look this up
  - Find $O(n)$
    - Throwing out half at each step
    - can assume base 2 for log in this class
  - Insert $O(1)$
  - Delete (After Find) $O(1)$
- Hash Tables
  - Expected
    - Find $O(1)$
    - Insert $O(1)$
    - Delete (After Find) $O(1)$
  - Worst Case
    - Find $O(n)$
    - Insert $O(n)$

3 Asymptotics

- $f(n) = 5n^2 - 1000, g(n) = 10n^2$
  - $o(g)$: false
  - $O(g)$: true
  - $\Theta(g)$: true
  - $\Omega(g)$: true
  - $\omega(g)$: false
- $f(n) = n^3, g(n) = 3n^7 - 2n$
  - $o(g)$: true
  - $O(g)$: true
  - $\Theta(g)$: false
  - $\Omega(g)$: false
  - $\omega(g)$: false
- $f(n) = \sqrt{n}, g(n) = \ln(n)$
  - $o(g)$:
  - $O(g)$:
  - $\Theta(g)$:
  - $\Omega(g)$:
  - $\omega(g)$: