

HW4 EE599

Name: Tianyi Xu

USC ID: 3860934574

Question 1

a. `filter()`

Iterate from first to last and copy each element at most.

Runtime Complexity: $O(N)$

b. `map()`

Iterate from first to last and square each element.

Runtime Complexity: $O(N)$

c. `reduce()`

Iterate from first to last and accumulate each element.

Runtime Complexity: $O(N)$

Question 2

a. `MaxHeap()` and all Get functions

Runtime Complexity: $O(1)$

b. `int top()`

Runtime Complexity: $O(1)$

c. `void push(int v)`

Heap is a complete binary tree.

Runtime Complexity: $O(\log N)$

d. `void pop()`

Heap is a complete binary tree.

Runtime Complexity: $O(\log N)$

e. void Trickle functions

Heap is a complete binary tree.

Runtime Complexity: $O(\log N)$

Question 3

a. `BST()`

Runtime Complexity: $O(1)$

b. `BST(std::vector<int> initial_values)`

Push each element.

Runtime Complexity: $O(N)$

c. `~BST()`

We must delete each node.

Runtime Complexity: $O(N)$

d. `void push(int key)`

At worst we have to iterate each element to push key.

Runtime Complexity: $O(N)$

e. `bool find(int key)`

At worst we have to iterate each element to find key.

Runtime Complexity: $O(N)$

f. `bool erase(int key)`

At worst we have to iterate each element to erase key.

Runtime Complexity: $O(N)$

Question 4

We must print each node.

Runtime Complexity: $O(N)$

Question 5

Firstly store each element in a heap. Then pop all elements in the heap and modify the vector.

Runtime Complexity: $O(N + N) = O(N)$

Question 6

We must iterate the vector.

Runtime Complexity: $O(N)$