HW1 EE599

Name: Tianyi Xu

USC ID: 3960934574

Question 1

All functions just simply add the inputs.

Runtime Complexity: O(1).

For functions handling int and string, it involves to_string(). This may affect the complexity. Let length of int be L.

Runtime Complexity: O(L).

Question 2

Use sizeof to get the size.

Runtime Complexity: O(1).

Question 3

a. remove duplicates

Iterate the vector and use hashmap to mark the values and help adjust the vector. If the input is null, we do not change anything and print a warning.

Runtime Complexity: O(N).

b. reverse

Use algorithm::reverse() which uses two ‘pointer’, swaps the element and moves the pointers.

Runtime Complexity: O(N/2) = O(N).

c. remove odd numbers

Iterate the vector and adjust the vector. If the input is null, we do not change anything and print a warning.

Runtime Complexity: O(N).

d. concatenate

Push all elements to a new vector.

Runtime Complexity: O(N).

e.union

First sort two vectors, then use two index iterate them and select the intersection.

Runtime Complexity: O(NlogN + N) = O(NlogN).

Question 4

Runtime Complexity: O(1).

Question 5

a. swap

Runtime Complexity: O(1).

b. reverse

Use algorithm::reverse() which uses two ‘pointer’, swaps the element and moves the pointers.

Runtime Complexity: O(N/2) = O(N).

c. lower

Iterate the char.

Runtime Complexity: O(N).

Question 6

a. simple

Use two ‘pointer’, one → first and one → last. Compare the elements and move the pointers until they meet.

Runtime Complexity: O(N/2) = O(N).

b. approximate

The same algorithm as 6.a, adding some limitations.

Runtime Complexity: O(N/2) = O(N).

Question 7

Firstly remove the duplicates in inputs. Then compare the size. Finally create the map.

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

Question 8

Firstly sort the vector. Then reverse it. Finally calculate the median and rearrange.

Runtime Complexity: O(NlogN + N/2 + N/2) = O(NlogN).