Homework 5

**Question 1a)**

50

20

10

40

15

30

60

70

65

80

73

25

37

**Question 1b)**In-order traversal: 10, 15, 20, 25, 30, 37, 40, 50, 60, 65, 70, 73, 80

Pre-order traversal: 50, 20, 10, 15, 40, 30, 25, 37, 60, 70, 65, 80, 73

Post-order traversal: 15, 10, 25, 37, 30, 40, 20, 65, 73, 80, 70, 60, 50

**Question 1c)** After deleting 30

50

20

10

40

15

25

60

70

65

80

73

37

After deleting 30, then deleting 20

50

15

10

40

25

60

70

65

80

73

37

**Question 2a)**

*struct Node {*

*Node (value, parent\_node) : val(value), left(nullptr), right(nullptr), parent(parent\_node)*

*{}*

*int val;  
 Node \* left;*

*Node\* right;*

*Node\* parent;*

*}*

**Question 2b)**

*//Assuming we don’t insert duplicates, also the parent at the first call should be nullptr so we need a helper function*

*void Insert(Node\* curr, int target) {*

*InsertHelper(curr, target, nullptr);*

*}*

*void insertHelper(Node \* curr, int target, Node \*parent) {*

*if (curr == nullptr) {*

*Create a new node with value = target and parent = curr, left and right children set to nullptr*

*}*

*else if (curr->val == target) return; //Avoids duplicates*

*else if (curr->val < target) {*

*call insert with (curr->left, target, curr);*

*}*

*else if (curr-> val > target) {*

*call insert with (curr->right, target, curr);*

*}*

*}*

**Question 3**

a)

8

3

0

2

6

4

b)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 8 | 3 | 6 | 0 | 2 | 4 |

Size = 6

c)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 6 | 3 | 4 | 0 | 2 |

Size = 5

**Question 4)**

a) O(C+S)

b) O(log(C) + S)

c) O(log(C) + log(S))

d) O(1 + log(S)) = O(log(S))

e) O(1 + 1) = O(1)

f) O(log(C) + S)

g) O(1 + S\*log(S)) = O(Slog\*(S))

h) O(C\*log(S))