CS 32 Homework 5

1(a) BST after insertion:

50

74

65

80

70

60

15

10

40

20

30

25

36

1(b) Print-outs by different traversals:

|  |  |
| --- | --- |
| In-Order | 10, 15, 20, 25, 30, 36, 40, 50, 60, 65, 70, 74, 80 |
| Pre-Order | 50, 20, 10, 15, 40, 30, 25, 36, 60, 70, 65, 80, 74 |
| Post-Order | 15, 10, 25, 36, 30, 40, 20, 65, 74, 80, 70, 60, 50 |

1(c) BST after deletion:

50

74

65

80

70

60

15

10

Deleting node 30

40

20

25

36

50

74

65

80

70

60

15

10

40

25

36

Deleting node 20

2(a) Structure definition of special BST:

struct Node

{

int m\_data;

Node\* parent;

Node\* left;

Node\* right;

};

2(b) Pseudocode of insertion:

insert(node pointer, root pointer)

if tree is empty/root is null

set root to node and node’s parent to null;

else if node’s value is equal to root’s value

do nothing;

else if node’s value is less than root’s value

if root has a left child pass in left child as root in insert;

else set root’s left child to node and node’s parent to root;

else if node’s value is greater than root’s value

if root has a right child pass in right child as root in insert;

else set root’s right child to node and node’s parent to root;

3(a) Resulting heap:

8

4

6

0

2

3

3(b) Heap represented in array:

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

3(c) Array after removal again:

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

4(a) O(C + S)

4(b) O(logC + S)

4(c) O(logC + logS)

4(d) O(logS)

4(e) O(1)

4(f) O(logC + S)

4(g) O(S)

4(h) O(C\*logS)