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CS32 Homework 5

1a. 50

20 60

10 40 70

30 45 65 80

25 35 75

1b. After deleting 30

50

20 60

10 40 70

35 45 65 80

25 75

After deleting 20

50

10 60

40 70

35 45 65 80

25 75

1c.

InOrder: 10 20 25 30 35 40 45 50 60 65 70 75 80

PreOrder: 50 20 10 40 30 25 35 45 60 70 65 80 75

PostOrder: 10 25 35 30 45 40 20 65 75 80 70 60 50

2a. 6

3 5

1 2 4

2b.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 6 | 3 | 5 | 1 | 2 | 4 |

2c.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5 | 3 | 4 | 1 | 2 |

3a.

struct Node

{

int value;

Node \*parent, \*leftChild, \*rightChild;

}

3b. Pseudocode to insert value into BST:

If root is null/tree is empty,

Allocate a new node and assign value to node

Assign root pointer to new node and return

Else, tree is not empty, so assign pointer to root.

Starting from root, while not yet inserted:

If current node’s value is equal to target value, return.

If target value is less than current node’s value

Check if there is left child

If so, move pointer left

Otherwise

Allocate new node and assign value

Assign current pointer to new node’s parent

Assign new node to current pointer’s leftChild, then return.

If target value is greater than current node’s value

Check if there is right child

If so, move pointer right

Otherwise

Allocate new node and assign value

Assign current pointer to new node’s parent

Assign new node to current pointer’s rightChild, then return.

4a.

A B C D E F G H I

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | **1** | **1** | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 |
| 0 | 0 | 0 | **1** | **1** | 0 | 0 | 0 | 0 |
| 0 | **1** | 0 | 0 | 0 | 0 | 0 | **1** | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | **1** |
| 0 | 0 | **1** | 0 | 0 | 0 | 0 | **1** | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 |
| 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 |

A

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A 🡪 B 🡪 C 🡪 null

B 🡪 H 🡪 null

C 🡪 D 🡪 E 🡪 null

D 🡪 B 🡪 H 🡪 null

E 🡪 G 🡪 null

F 🡪 G 🡪 I 🡪 null

G 🡪 C 🡪 H 🡪 null

H 🡪 G 🡪 null

I 🡪 C 🡪 null

4b.

EGCDBH

EGHCDB

EGCDHB