CP2410 Practical 09

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Question 1

Question 2

Q2.

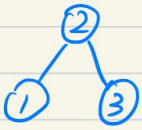
Using permutation ${}_3P_3 = \frac{3!}{(3-3)!} = 6$.

Depends on the order of insertion, the final binary search tree could looks like:

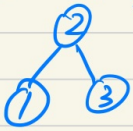
1. {1, 2, 3}

2. {1, 3, 2}

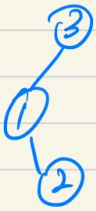
3. {2, 1, 3}



4. {2, 3, 1}



5. {3, 1, 2}



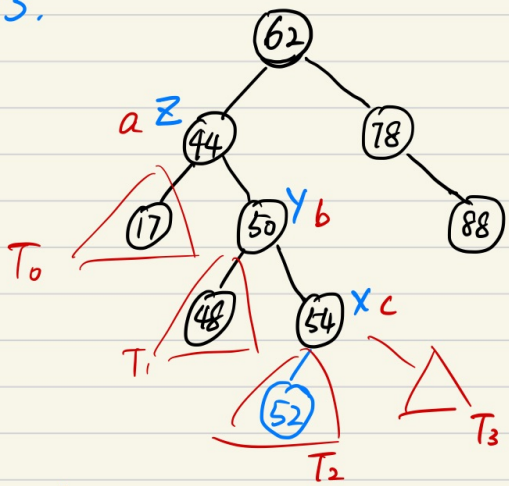
6. {3, 2, 1}.

BST 3 and 4 are the same

Therefore, there are 5 different BST.

Question 3

Q3.



1. trace upwards and find first unbalanced node, which is 44, and that is Z.

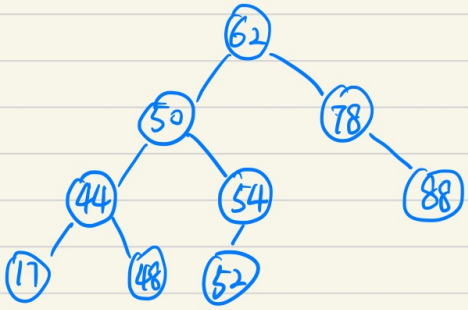
2. Z's child with higher height is Y.
   Y's child with higher height is X.

3. Do inorder traverse for X, Y, Z

a	b	c
z	y	x

, and mark subtrees T_0, T_1, T_2, T_3

4. Replace Z with b. a will be left child of b with T_0, T_1 as left, right subtrees.
   c will be the right child of b, with T_2, T_3 as left and right subtrees.

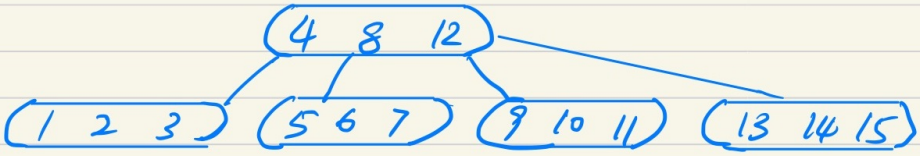


Question 4

Q4.

(2,4) tree with fewest number of nodes to store 1, 2, ..., 15.

There will be 5 nodes.



Question 5

Q5.

Insert 5, 16, 22, 45, 2, 10, 18, 30, 50, 12, 1 into an empty (2,4) tree.

1. 5

2. 5 16

3. 5, 16, 22

4. 16 / 5 | 22, 45

5. 16 / 2, 5 | 22, 45

6. 16 / 2, 5, 10 | 22, 45

7. 16 / 2, 5, 10 | 18, 22, 45

8. 16, 22 / 2, 5, 10 | 18 | 30, 45

9. 16, 22 / 2, 5, 10 | 18 | 30, 45, 50

10. 5, 16, 22 / 2 | 10, 12 | 18 | 30, 45, 50

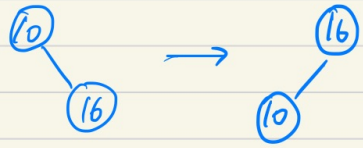
11. 5, 16, 22 / 1, 2 | 10, 12 | 18 | 30, 45, 50

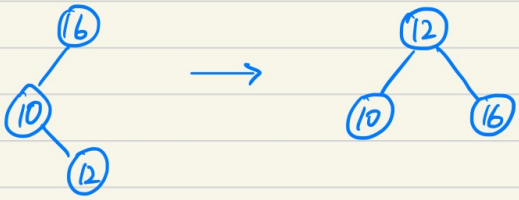
Question 6

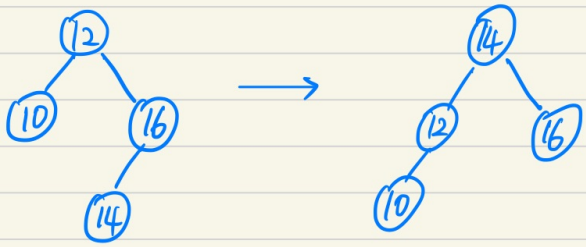
Q 6.

Inserting 10, 16, 12, 14, 13. into an empty splay tree.

1. 

2. 

3. 

4. 

5.