COM 121β -Data Structures and Algorithms

Tutorial-01

1. State the most appropriate data structure for each of the following problems,
    i. You want to build an application that facilitate undo and redo options.
        a. Unsorted list
        b. Sorted List
        c. Stack
        d. Doubly linked list

    ii. You want to build a meeting reminder that keeps track of events you schedule and periodically checks the next event to sound an alarm to remind you of the next thing you need to do.

        a. List
        b. Stack
        c. Queue
        d. Priority Queue

    iii. You want to build a table of contents for a textbook. The textbook consists of chapters, chapters consist of sections, and sections consist of subsections

        a. List
        b. Doubly linked list
        c. Tree
        d. Binary Tree

2. Evaluate the following postfix notation of expression using stack. Show status of stack after execution of each operation:
   15 3 2 + / 7 + 2 *

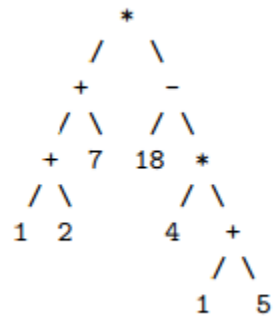
3. Draw a tree which contains following items.

```
Food & Drinks
    Drinks
        Coffee
            Black coffee
            Iced coffee
            Cappuccino
        Tea
            Ginger Tea
            Green Tea
    Burgers
    Sandwiches
        Chees sandwich
```

4. Differentiate full binary tree and complete binary tree.

5.
   i. Draw a binary search tree to store following elements,
      60,51,75,43,57,62,81,24,50,55,59,84
   ii. Insert 65 and 80 to the above drawn binary search tree.
   iii. Delete 84 and 62 from the above drawn binary search tree.
   iv. Give two separate binary search trees that can be result after deleting 51 from the above drawn binary search tree.
   v. Give the sequence of elements in pre-order traversal, in-order traversal and post order traversal.

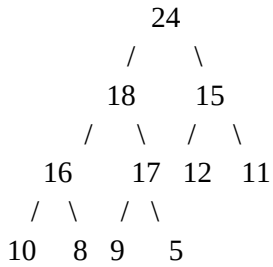
6. Consider the following expression tree



   i. What is the formula represented by the tree?
   ii. What is the sequence of symbols that would result from a post-order, in-order and pre-order traversal?

7. Draw expression trees for following formulas,
   i. [(5+3)*4]/8
   ii. [(8-2)+3]*2
   iii. {[(5+3)*4]/8}+{[(8-2)+3]*2}
   iv. {[(2+5)*2] / [(9-5)+2]}-{[4*(8-5)]-9}

8. Consider the following binary heap,



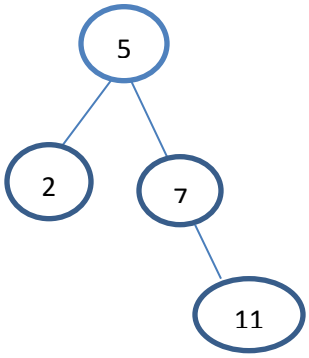
   i. What is the type of above drawn binary heap?
   ii. Give the array implementation of above drawn binary heap.

9. Consider the following array implementation and draw corresponding binary heap.

0	1	2	3	4	5	6	7	8	9	10
1	3	4	5	6	7	8	10	12	13	9

10. What are the AVL trees among following trees? Justify your answer

a.



b.