

EE 453/717: Advanced Computing for Electrical Engineers
Indian Institute of Technology Bombay
Autumn 2010

Quiz 1 : 10 points

September 6, 2010

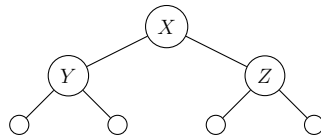
1. Write a C++ function to remove duplicates in an array of sorted integers. Specifically, given an array a of sorted integers of which m are distinct, it should be modified to contain the m distinct integers in the first m positions. The contents of the remaining positions are irrelevant.

OLD a : [1] [2] [8] [8] [24] [60] [60] [60] [60] [75] [100] [100] [123]
NEW a : [1] [2] [8] [24] [60] [75] [100] [123]

Input to the function is an array of integers along with its size. The return value of the function is the number of distinct integers in the modified array. So the function declaration is the following.

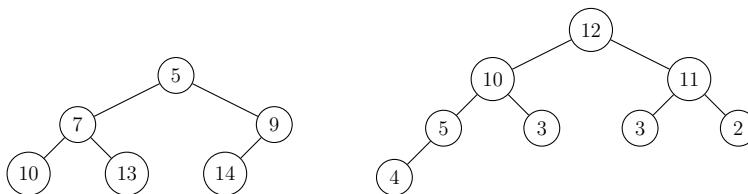
```
int removeDup(int* a, int size);
```

2. Consider a binary tree in which internal nodes contain a label consisting of a single alphabet and the external nodes have no labels. For example, in the below binary tree, the internal nodes have labels X , Y and Z . The external nodes have no labels.



A traversal of such a tree in a particular order results in the printing of the label when an internal node is encountered. Nothing is printed if an external node is encountered. Suppose the preorder traversal of such a binary tree results in the output **ABDGHCEF** and the inorder traversal results in the output **BGDHAECEF**. Draw the binary tree indicating the internal nodes by their labels.

3. (a) Consider the min heap of integers on the left below. Suppose we want to insert the integer 8 into this heap. Illustrate the heapification process by drawing the intermediate states of the heap.



- (b) Consider the max heap of integers on the right above. Draw the heap which results from removing the root. Also draw the intermediate heap states during the heapification process.