

(Spring 2002)

Name

Pledge: I have neither given nor received unauthorized assistance in this exam.

(Sign here)

Below, draw the binary search tree (BST) that results from inserting the numbers
50, 10, 20, 15, 12, 5
into an initially empty BST.

Below, draw the BST that results from deleting the number 50 from the BST obtained
above.

Below, draw the AVL binary search tree (AVLtree) that results from inserting the numbers
50, 10, 20, 15, 12, 5
into an initially empty AVLtree.

Below, draw the AVLtree that results from deleting the number 50 from the AVLtree obtained above.

Give an analysis of the run-time of each of the following program fragments in terms of the parameter n (Big-Oh will do).

```
for (i=1; i<=n; i++)  
    for (j=1; j <= n ; j=j+2)  
        sum++;
```

```
for (i=1; i<=n; i++)  
    for (j=1; j <= n ; j=j*2)  
        sum++;
```

. A vertex in a directed graph G that consists of n vertices is said to be flumbox if it has indegree $(n-1)$ and outdegree 0 .

- At most how many flumbox vertices may graph G have?

- Briefly describe *efficient* algorithms for identifying flumbox vertices in G if G is represented as
 - an adjacency matrix

- an adjacency list