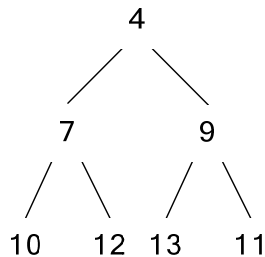# Data Structures: 505 22240 / ESOE 2012

**Homework Assignment 4**: Heap, Tree, and Graph
<u>Due</u>: the week after next in class, 11:10am

<u>Total score: 100</u>

1. Given the minheap myHeap in the figure below, show what it would look like after each of the following pseudo-code operations (assuming cumulatively): (15%)
   a. myHeap.add(8) (5%)
   b. myHeap.add(5) (5%)
   c. myHeap.removeMin() (5%)

2. Does the order in which you insert items into a heap affect the heap that results? Explain. (10%)

3. Using the binary search tree shown below, write the sequence of nodes visited in (10%)
   a. Preorder traversal. (5%)
   b. Postorder traversal. (5%)
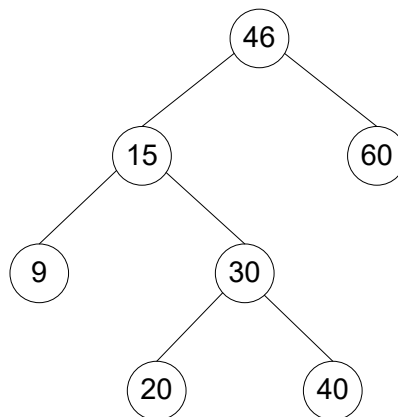
4. Consider the following sequences of operations on an initially empty search tree: (20%)

   Insert 10, Insert 100, Insert 30, Insert 80, Insert 50, Remove 10, Insert 60, Insert 70, Insert 40, Remove 80, Insert 90, Insert 20, Remove 30, Remove 70.

   What does the tree look like after these operations execute if the tree is

   a. A binary search tree? (10%)

   b. A 2-3-4 tree? (10%)

   Please draw the tree after each operation for all cases.

5. Consider the graph figure below and answer the following: (20%)

   a. Will the adjacency matrix be symmetrical? (2%)

   b. Provide the adjacency matrix. (9%)

   c. Provide the adjacency list. (9%)
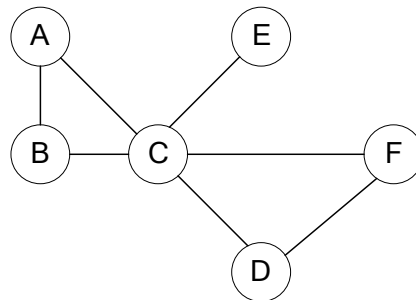
6. For the graph shown below: (25%)

   a. Draw all the possible spanning trees. (20%)

   b. Draw the minimum spanning tree. (5%)