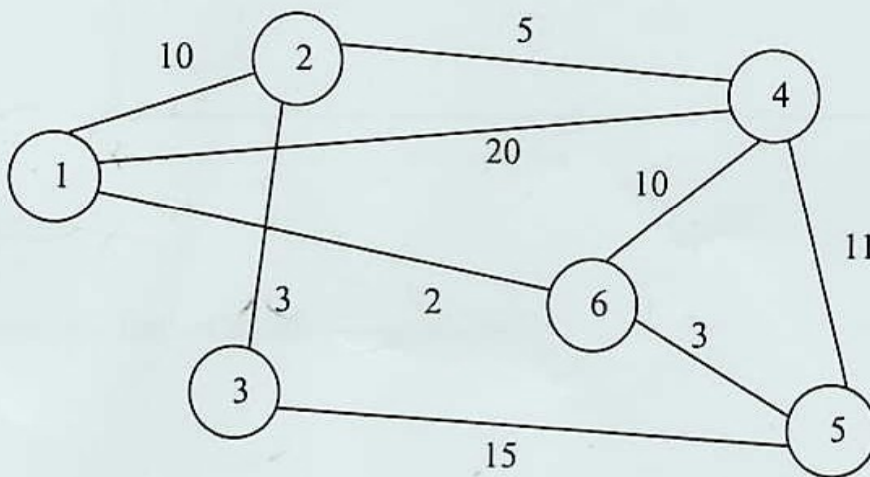




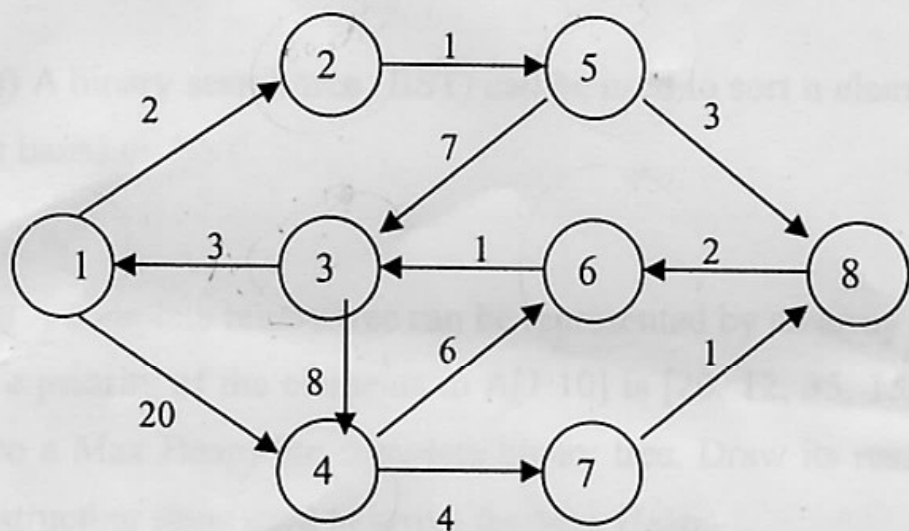
Dec. 18, 2003

1. (20 pts) A binary search tree (BST) can be used to sort  $n$  elements. Describe briefly the steps of sorting based on BST.
2. (20 pts) A complete binary tree can be represented by an array of  $n$  elements. Assume that  $n = 10$  and the priority of the elements in  $A[1:10]$  is  $[20, 12, 35, 15, 10, 80, 30, 17, 2, 1]$ . Heapify (make into a Max Heap) the complete binary tree. Draw its resulting Max Heap and also give the reconstructing steps used to arrive the Max Heap.
3. (20 pts) List the order in which the edges of the graph below are visited when running Kruskal's MST (Minimum-Cost Spanning Tree) algorithm.



4. (20 pts) A sorting algorithm is said to be stable if the original ordering for duplicate keys is preserved. For example, consider a list of ordered pairs  $L := \{(A,3), (B,5), (C,2), (D,5), (E,4)\}$ . If a stable sorting algorithm sorts  $L$  on the second value in each pair, then the result is guaranteed to be  $\{(C,2), (A,3), (E,4), (B,5), (D,5)\}$ . However, if an algorithm is not stable, then it is possible that  $(D,5)$  may come before  $(B,5)$  in the sorted output. Of the sorting algorithms

5. (24 pts) For a given directed graph below, show the computation steps of Dijkstra's algorithm to determine the cheapest path from node 1 to every other node.



The progress should be of the following form:

Iteration	S	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]	D[8]
initial	{1}	.....						
1								
....								

----- End of Exam -----