CS 278	**Analysis of Algorithms**	Test 2
Name:	Summer 2001	Max Pts: 40

Important: This is an open book test. You can use any books, notes, or paper. Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [5 pt] Write a recursive function to find the height of a leaf node that is closest to the root in a binary tree.

2. [5 pt] Give the relationship between the number of edges and the number of nodes in a complete graph with N nodes.

3. [12 pt] Show the sorting of the array

$$QJOPXKYCTGBRUZ$$

using quicksort with median of three partitioning. Show all the different stages of the array, and clearly illustrate when the partitioning is completed in each recursive step. Will the algorithm perform better in this case compared to just regular quicksort algorithm (without median of three partitioning)?

4. [8 pt] Show the sorting of following string using shellsort with the sequence $(3 * i + 1)$.

$$VBELSJORPTGMXDU$$

5. [10 pt] Build a heap from the following keys.

$$TCAHLIOXYPEGZBJF$$

Show all stages of the heap as it is built. Now, show all stages of the array as the heapsort algorithm is applied. Make sure that the heap relationship ensures about the parent being larger than the child at every stage.