CS 278	**Analysis of Algorithms**	Test 2
Name:	Winter 2001	Max Pts: 37

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 count the number of nodes in a binary tree.

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

3. [8 pt] Write a recursive program (pseudocode will do) to count the number of elements in a linked list of integers that are less than a specified number N.

4. [8 pt] Show the sorting of the array

$$KIAEXBJUYDCVNL$$

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.

5. [5 pt] Two most common methods used to represent graphs are known as *adjacency matrix* and *adjacency lists*. What is the amount of space used by each of them (in big-oh notation)? Which method will be preferable to use with sparse graphs?

6. [6 pt] Comment on the stability of sort using bubble sort, insertion sort, selection sort, shell sort, quick sort, and merge sort.