Important: This is an open book test. You can use any books, notes, or paper. *Do not log into the computer during the test.* Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem.

1. [10 pt] Write a recursive function to count the number of nodes in a list. [If you cannot write recursive, you will get half credit for writing an iterative function to do the same]. Assume that the list is dynamically allocated.

2. [10 pt] Write a function to print the information at each node in the linked list in reverse order. That is, the last element will be printed first, then the next to last element, and so on, and finally, the first element. Assume that you have a function called `print_info ( node_ptr node )` to print the information at the node. Assume that the list is dynamically allocated.

3. [10 pts] Assume that `l` is a circular list with the information part of each node containing an integer. Write a function that returns pointer to a node containing a given integer, if it exists, and `NULL` otherwise.

4. [10 pts] Write a function that returns the height of a binary tree. [Hint: Height is determined by adding 1 to the larger of the height of two subtrees.]

5. [12 pt] Show different sorting passes for the following keys using selection sort, bubblesort, and mergesort.

T H E G R A S C O M N D I V F X Y L

6. [4 pt] What is wrong with the definition of the symbolic constant `MAX` given below? Will it cause compilation errors? The `#` symbol starts in column 1.

```
#define MAX = 10
```

7. [6 pt] Write a macro in C to compute the average of two numbers.