COS128: Honors General Computer Science **Spring 1996**

Third Midterm Exam – Solution to Problem 1

Problem 1, 25 points: Consider an abstract data type that represents an general tree, where each node can have any number of children. Each node of the tree can store an integer value. Suppose a tree node is represented by type `treenode` and the following functions are provided:

```
int children ( treenode t);
    returns the number of children of the node t

treenode child (treenode t, int n);
     returns the nth child of treenode t

int value (treenode t);
     returns the value stored at node t

void changevalue (treenode t, int v);
     changes the value stored at node t to v
```

Write a function

```
void max(treenode t);
```

that for the tree rooted at t, replaces the value of each internal node with the maximum value of all the leaves that are decendents of the internal node.

SOLUTION:

```
void max(treenode t)
{
int maxval, i, childct;
childct = chiltren(t);
if (childct > 0)
    {
      for ( i = 0;  i < childct;  i++)
            max(child(t,i));
      maxval = value(child(t,0));
      for (i = 1; i < childct; i++)
           if (value(child (t,i) > maxval)
                 maxval = value(child(t,i));
     changevalue(t, maxvalue);
    }
```