

Programming Assignment #4

Recursion practice

CS 3358.501, Summer I 2012

Instructor: Jill Seaman

Due: Thursday, 6/21/2012 (upload electronic copy by 4:30pm)

Problem:

Write functions for each of the following problems. Each problem should be solved by writing a recursive function (potentially with an auxiliary or driver function). Your final program should not have any loops in it.

All of your solutions should be in a single .cpp file. The main function of the file should demonstrate each of your solutions, by running some tests and producing some output.

1. Table of Squares:

Convert the following function to one that uses recursion:

```
void tableOfSquares (int n) {
    for (int num=1; num<=n; num++) {
        cout << num << "      " << (num * num) << endl;
    }
}
```

2. Recursive Power Function

Write a function that uses recursion to raise a number to a power. The function should take two arguments, the number to be raised to the power (floating point) and the power (a non-negative int).

3. isMember function

Write a boolean function named isMember that takes three arguments: an array, its size (number of elements) and a value. It should return true if the value is found in the array, or false if the value is not found in the array.

4. maxNode function

Write a function that takes one argument, a List_3358<Item> (your program will need to include the appropriate header file). The function should return the largest Item in the list. Your function should fail if the list is empty.

5. Palindrome detector

A palindrome is any word, phrase, or sentence that reads the same forwards or backwards. Here are some palindromes (find more with google):

level
Pot top
A man, a plan, a canal, Panama

Write a boolean function that determines if a string argument is a palindrome. The function should return true if the argument reads the same forwards and backwards. For full credit, your function should ignore spaces and be case-insensitive.

Output:

Here is the output from my file. I'm sure you can do better:

Table of squares:

N	N Squared
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81
10	100

Power function:

2 to the 5th power: 32

Member function

1 2 3 4 5 has 4?: YES

1 2 3 4 5 has 6?: NO

MaxNode of {10,101,11,9,100}: 101

Is "A man A plan A canal Panama" a palindrome? YES

Is "No one" a palindrome? NO

NOTES:

- Just one file. 5 (or more) functions plus main for testing.
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Style:

See the Style Guidelines document on the course website.

Logistics:

Please submit your solution in a single file. You can call it recursion_XXXXXX.cpp.

The XXXXX is your TX State NetID (your txstate.edu email id).

You don't need to submit the List_3358.h file. I'll find one to use with it.

Submit: an electronic copy only, using the Assignments tool on the TRACS website for this class.