CS 3710 Vocational Languages
Assignment 2

Due date: September 24, 2012
Submit your source code to d2l and bring a hard copy to the class.

1 Arrays and Pointers (30 marks)

Implement two versions of strcat in the following main function:

```c
#include<stdio.h>
main()
{
    char amessage[]="Hello,"
    char bmessage[]="Mr. Smith!"
    //constant pointer version implementation:
    //print the concatenated message "Hello, Mr. Smith!"

    //pointer variable version implementation:
    //print the concatenated message "Hello, Mr. Smith!"
}
```

In the constant pointer version, manipulation of array elements is through the array name. In the pointer variable version, a pointer variables is defined for the array. The manipulation of array elements is through the pointer variable.

2 Two-dimensional Array (30 marks)

A completed Sudoku puzzle satisfies the following properties: every row, column, and 3 x 3 box contains every digit from 1 to 9 inclusively. Implement a C function int sudokuChecker(int matrix[9][9]) that returns 1 if the matrix satisfies the Sudoku properties or 0 otherwise. In the main function, initialize at least 2 matrices that satisfy the Sudoku properties and 2 matrices that do not satisfy the Sudoku properties. Test your C function using these matrices.
3 Self-referential Structures (40 marks)

A binary tree is a data structure where each node has at most two child nodes. The following defines a binary tree where each node stores a book record. The left-child of a node stores a book with an earlier publishing year while the right-child of a node stores a book with a later publishing year.

```c
struct book {
    char* name;
    int year;
}
typedef struct tnode {
    struct book *aBook;
    struct tnode *left;
    struct tnode *right;
} BTree;
```

Implement the following C functions:

- **BTree* addBook(BTree* nodeP, char* name, int year)**: It creates a new BTree if it is empty. Otherwise, it adds the book record to the correct position in the BTree.
- **void freeBTree(BTree* books)**: It frees the memory space being allocated for the passed BTree argument.
- **void printBooks(BTree* books)**: It prints the books stored in the passed BTree argument in year.

Use the following 4 books to test your code:

- Scala for the Impatient, 2012