HW #10: Variable Scope and Pointers

Due dates:

Part I: Monday March 28th, at the beginning of the class. Make sure to write your name and msunetid on your paper.

Part II: Sunday March 27th, 11:59 pm through Handin (https://secure.cse.msu.edu/handin)

Part I: Comprehension Questions

1. Write C statements for the following. Assume that x is declared as int (3 pts)

    a. Declare a pointer to an int, call it p

    int *p;

    b. Set p to point to x

    p = &x;

    c. Set the value of x to 7 using p

    *p = 7;

    d. Print the value of x using p

    printf("%d", *p);

    e. Print the memory address of x using x

    printf("%p", &x);

    f. Print the memory address of x using p

    printf("%p", p);

2. Consider the following program with only the variable declarations shown. For each statement, specify if it is true or false. (2 pts)

    ```
    int x;
    void alpha(int a, int x){
            int b;
    }

    void beta() {
    }

    int k;
    int main(){
            int x, y, z;
            {
                    int y, z;
            }
    }
    ```

a. Function alpha can access the external variable x

   FALSE

b. In the inner block of the main function, the block variable y hides the local main variable y

   TRUE

c. The declaration of variable k at the given location generates a compilation error

   FALSE

d. Function beta is the only function that can access global variable x

   TRUE

3. Write a recursive function countDown that prints numbers 1 to n in descending order (3 pts)

```
void countDown(int n) {
        printf("%d\n", n);
        if (n == 1)
                return;
        countDown(n-1);
}
```

4. Consider the following function. Complete the function so it sets the sum of a, b, c in the variable pointed to by sum and their minimum in the variable pointed to by min   (2 pts):

```
int findSpecial(int a, int b, int c, int *min, int *sum) {
        int sumAll = a + b + c;
        int minAll;
        if (a <= b && a <= c)
                minAll = a;
        else if (b <= c && b <= a)
                minAll = b;
        else
                minAll = c;

        *min = minAll;          //The value that min points to, set it to minAll
        *sum = sumAll;          //The value that sum points to, set it to sumAll

}
```

Part II: Lab Assignment

Getting started

Change into the cse220 directory. Create a new directory called lab10.
Change into the new directory. Implement the program below in your lab10 directory.

Temperature Records

Create a program to store temperatures recorded over a period of time. The program should store the temperatures in a global array variable. Assume that the maximum number of temperatures that may be stored is 500.

Add the following function to your program:
- A function that finds the average of all temperatures stored
- A function that finds the average of the last 5 recorded temperatures. If there are less than 5 temperatures recorded, return the average of all recorded temperatures.
- A function that records a new temperature. It must check if there is still space in the array.
- A function that prints the number of temperatures recorded
- A function that prints all the temperatures recorded

Organize the program so the function prototypes are presented first, and the definitions after the main function. Your program should keep asking the user to select an option from the following:
- (A) computed average of all temperatures,
- (B) compute the average of the last five,
- (C) add a new temperature,
- (D) print the number of temperatures recorded,
- (E) print the temperatures recorded, or
- (F) exit the program.

Call your program temperatures.c. Compile and test your program.
Submit through the handin system the source code temperatures.c

Handin

The "handin" system has options to allow you to review your files online and to download them. You Should always verify that you submitted the correct files and they were received by the handin system. You can submit files as many times as you like for a particular assignment. Handin will only keep the last version of each file. Remember to submit your files prior to the deadline as you won't be able to use handin if the deadline has passed.