Spring 2014 Introduction to Computer Programming (COP 3223) Test #3 Section 4

First Name: _____ Last Name: _____

Note: Please use C syntax to respond to each programming question.

1) (5 pts) The geometric mean of two numbers, a and b is $\sqrt{ab}$. Complete the function below so that it returns the geometric mean of its two parameters, *a* and *b*. You may assume that the math library is included and that both input parameters are positive. The function that calculates a square root is sqrt and the function that calculates an exponent is the pow function. In particular pow(x, y) returns x^y.

```
#include <math.h>

double geomean2(double a, double b) {




}
```

2) (8 pts) The geometric mean of three numbers, a, b and c is $\sqrt[3]{abc}$. Complete the function below so that it returns the geometric mean of its three parameters, *a*, *b*, and *c*. You may assume that the math library is included and that all input parameters are positive.

```
#include <math.h>

double geomean3(double a, double b, double c) {




}
```

3) (10 pts) In general the geometric mean of *n* numbers, $x_1, x_2, \ldots, x_n$ is $\sqrt[n]{x_1 x_2 \ldots x_n}$. Complete the function below so that it returns the geometric mean of the first *n* values in the array, *values*, where *values* and *n* are the formal parameters, respectively. Once again, you may assume that the math library is included and that n and all the values in the input array are positive. Do not worry about any overflow or imprecision issues.

```
#include <math.h>

double geomean(double values[], int n) {









}
```

4) (10 pts) Complete the function below so that it returns 1 if and only if the first *n* values of the input array *values* is in ***ascending*** sorted order. (Note: In order for an array to be in ascending order, each subsequent value must be ***greater than*** the previous value. Thus, an array storing 2, 3, 6, 8 and 12, in that order, is in ascending sorted order, but an array storing 3, 6, 8, 8 and 9 is NOT in ascending sorted order, since the two 8s are in a row.)

```
int isSorted(int values[], int n) {









}
```

5) (25 pts) A border square in a two-dimensional array is one that is in the top row, bottom row, leftmost column or rightmost column. Complete the function below so that it returns the number of border squares in the input array that store the value 0. The function takes in the two dimensional array. You may assume that its dimensions are NUMROWS x NUMCOLS, where these two values are the constants declared below.

```
#define NUMROWS 20
#define NUMCOLS 25

int numZeroBorderSqs(int grid[][NUMCOLS]) {









}
```

6) (12 pts) What is the output of the following program?

```
#include <stdio.h>

int f(int a, int b) ;

int main() {
    int a = 5, b = 12, c = 7;
    b = f(a+b, a+c);
    printf("a=%d, b=%d, c=%d\n", a, b, c);
    c = f(c, b);
    printf("a=%d, b=%d, c=%d\n", a, b, c);
    return 0;
}

int f(int a, int b) {
    int c = 3*a - b;
    b = 24 - a;
    a = c%a;
    printf("a=%d, b=%d, c=%d\n", a, b, c);
    return 2*b + a;
}
```

a=____,b=____, c=____

a=____,b=____, c=____

a=____,b=____, c=____

a=____,b=____, c=____

7) (10 pts) What is the output of the following program?

```
#include <stdio.h>

int main() {

    int i, array[10];
    for (i=0; i<10; i++)
        array[i] = (3*i+2)%10;
    for (i=0; i<5; i++) {
        int temp = array[i];
        array[i] = array[9-i];
        array[9-i] = temp;
    }
    for (i=0; i<10; i++)
        printf("%d ", array[i]);
    printf("\n");

    return 0;
}
```

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

8) (12 pts) What is the output of the following program?

```
#include <stdio.h>

int f(int* a, int b) ;

int main() {

    int a = 5, b = 12, c = 7;
    b = f(&b, a+c);
    printf("a=%d, b=%d, c=%d\n", a, b, c);
    c = f(&c, b);
    printf("a=%d, b=%d, c=%d\n", a, b, c);
    return 0;
}

int f(int* a, int b) {
    int c = 3*(*a) - b;
    b = 24 - (*a);
    *a = c%(*a);
    printf("a=%d, b=%d, c=%d\n", *a, b, c);
    return 2*b + (*a);
}
```

a=____,b=____, c=____

a=____,b=____, c=____

a=____,b=____, c=____

a=____,b=____, c=____

9) (5 pts) Give one example of data that is best stored in a two-dimensional array, in your opinion. Do not use tic-tac-toe, connect 4 or minesweeper as these were examples already given in class. Explain why a two dimensional array is an appropriate form of storage for your example.

10) (3 pts) UCF's Programming Team just finished in second place in the North American Invitational Programming Contest (NAIPC). One of the teams they beat was University of Lethbridge. In what continent is University of Lethbridge located?

_____

Scratch Page – Please clearly label any work you would like graded on this page.