University of New Brunswick, Faculty of Computer Science

CS 2263 Assignment 2 Winter 2018

Due Date: Friday, Feb. 2, 11:59 pm

Purpose: Practice with pointers and 2D arrays

1. Debug, Modify, and Examine

(a) The following function supposedly computes the sum and average of the numbers in the array `a`, which has length `n`. `avg` and `sum` point to variables that the function should modify. Unfortunately, the function contains several errors; find and correct them.

```
void avgSum(double a[], int n, double *avg, double *sum){
    sum = 0.0;
    for(int i=0; i<n; i++)
        sum += a[i];
    avg = sum/n;
}
```

(b) Once you have fixed the function, rewrite it using pointer arithmetic instead of array indexing (i.e. eliminate `i` and all uses of `[]`).

(c) Write a C program to test `avgSum` (either corrected from a, or from b). Examine it in the GNU debugger (either `DDD` or `gdb`) just after entering `avgSum`. Examine the values of the parameters `avg` and `sum`, then change stack frames and examine the values of the two variables where the sum and average will be stored, as well as their addresses. Show your terminal session using one or more screenshots.

Submit code listings for (a) and (b), and screenshots for (c).

2. Zombie Attack

As you have undoubtedly read in the Gleaner, Fredericton is experiencing a zombie attack. City officers have created a square grid (n by n zones) of the city and identified the coordinates where zombies currently reside. Fortunately, a UNB chemistry professor has developed a Zombie Blocking Spray (ZBS) that can stop the spreading of zombies. It has to be applied to the 4 adjacent zones of the infected zone. Under no circumstance can it be sprayed on zombie infect zones, because this may cause mutations with catastrophic consequences.

You must create a map where ZBS has to be applied. Write a program called *zombie.c* that reads n followed by a number of integer pairs indicating the

zombie locations. Print the original map followed by the map with the blocking information.

For example if *test.txt* is

```
10
2 3 9 9 0 5 3 3
```

then

```
$ ./zombie < test1.txt
Original map
.....Z....
..........
...Z......
...Z......
..........
..........
..........
..........
..........
.........Z

Map with blocking info
....BZB...
...B.B....
..BZB.....
..BZB.....
...B......
..........
..........
..........
.........B
........BZ
```

Write the following functions:

```
void set_zombies(int n, char fred[n][n]);
void print_zombies(int n, char fred[n][n]);
void block_zombies(int n, char fred[n][n]);
```

To deal with zombies on the borders, you may add extra zones surrounding the map (as discussed in class.) Test you program with at least 3 maps.

Commit at least two version of your program to your local Git repository.

To pass in the assignment: Create a single pdf document with your code listings and terminal session for question 1 and with your code listing and terminal session for question 2, as well as the source file (`zombie.c`) for question 2, **and the log file for your Git repository** (using the `git log` command). Submit these files to the Desire2Learn dropbox. Name your documents `LastName_FirstName_As2.pdf` and `LastName_FirstName_As2.zip` (`LastName` and `FirstName` are of course substituted with your last and first name).