CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

Problem Statement:

For this homework assignment, you will edit your Homework 6 to add functionality to play a simplified version of the classic game of Battleship on the screen/console. Unless so indicated, all requirements of Homework 6 hold in Homework 7. Note that there are some changes to this assignment!

You will take your solution from Homework 6 (or the solution posted on Blackboard, when available), and edit it as follows:

1. You shall organize your program into three files:
    - `prgm.h` will hold `#includes`, `#defines`, templates of any structure types, and a list of function prototypes.
    - `main.c` will hold the local `#include` file as well as the `main()` function for the program.
    - `func.c` will hold the local `#include` file as well all other functions (except `main()`, of course) used in the program.
2. Define a structure that contains the following four members: (1) a character member that holds the row used for the torpedo's position on the board – note that this character may be a single character in the range 'A' – 'J'; (2) an integer member that holds the column used for the torpedo's position on the board – note that this integer has a range 1 – 10; (3) an integer member that keeps track of the number of hits on the aircraft carrier – note that an aircraft carrier is sunk after 5 hits; and (4) an integer member that keeps track of the number of hits on the battleship – note that a battleship is sunk after 4 hits.
3. Update the function to display the game board by adding another parameter used to indicate whether or not to "reveal" the solution with ship positions visible or to display the current, active board. In displaying the board, you will display an 'X' for each position where a torpedo shot hit either ship and 'O' for each position where a torpedo shot missed a ship. If the "reveal" is not set, you will display a blank space for any position that is open (i.e., no ship is assigned, nor has a torpedo shot been fired) or contains a ship. If the "reveal" is set, you will still display a blank space for any position that is open, but will you display a 'B' for each position containing a battleship that has not been hit and an 'A' for each position containing an aircraft carrier that has not been hit. You will call this function to display the updated board after every torpedo shot fired by the user. During the game, "reveal" will not be set. However, after the game is won or lost, you will call this function with "reveal" set to display the board.
4. Add a value-returning function to check the status of the shot fired by the user, given the two-dimensional array for the board passed by reference and a pointer to a variable of the structure defined above. This function is called by `main()` and checks the status of the user-fired torpedo (i.e., hit, miss, duplicate shot,

etc.) and updates the board as a result of the shot fired. This function will also update the number of hits on either ship if either an aircraft carrier or battleship was hit and display a message to the screen/console if a particular ship was sunk. And finally, this function will return a value to indicate whether or not the game is won (i.e., both ships are sunk) or lost (i.e., at least one position on at least one ship has not been shot).

5. Inside `main()`, you will add a loop to play the game until either the game is won (i.e., both ships are sunk) or the user has fired all of his/her allocated torpedo shots without sinking both ships. For each turn, the user will enter a position (e.g., B7) corresponding to the position on the board where the torpedo will be fired. If the user enters an invalid coordinate position, you will indicate that the torpedo cannot be fired at that location and re-prompt the user to enter the coordinates again (without incrementing the number of shots fired). You may assume that the user enters the position correctly as [char][int], though one of both may not be within the valid range defined. You will parse this input and store it in the structure variable that is passed to the function to check the status of the shot fired by the user. Following each turn, you shall display an updated version of the board. If the user has sunk both ships, you will indicate that the user has sunk both ships and how many shots were fired to accomplish this task. If the user was unable to sink both ships in the allocated number of shots, you are to indicate that the user was not able to sink both ships and then display the final updated board with "reveal" set so that the position(s) of the ships are shown.

Sample input and output appears below (with input shown in bold) to provide you with direction as to what is expected from the program:

```
mat0299@faculty:~/csce1030$ ./ship.out
+------------------------------------------------------------+
|              Computer Science and Engineering              |
|               CSCE 1030 - Computer Science I               |
|          Student Name     EUID    euid@my.unt.edu          |
+------------------------------------------------------------+

                Welcome to Battleship!

Enter difficulty level of game (easy, normal, hard): easy

+------------------------------------------------------------+
| The computer program will randomly assign an aircraft car- |
| rier and a battleship, that are oriented either vertically |
| or horizontally, to the board. You will have 30 chances to |
| sink both the computer's aircraft carrier and battleship!! |
| You'll play on a 10 x 10 board, where the aircraft carrier |
| will have a length of 5 units and the battleship will have |
| a length of 4 units.                                       |
+------------------------------------------------------------+

Initializing board... now let's begin!
```

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                      |
B |                      |
C |                      |
D |                      |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #1 (e.g., B7): A4
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |       O              |
B |                      |
C |                      |
D |                      |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #2 (e.g., B7): b8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |       O              |
B |                O     |
C |                      |
D |                      |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #3 (e.g., B7): d5
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |       O              |
B |                O     |
C |                      |
D |         O            |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
```

```
J |                      |
  +----------------------+
Enter position to fire torpedo #4 (e.g., B7): e2
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |        O             |
B |                O     |
C |                      |
D |          O           |
E |    O                 |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #5 (e.g., B7): f8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |        O             |
B |                O     |
C |                      |
D |          O           |
E |    O                 |
F |                O     |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #6 (e.g., B7): g1
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |        O             |
B |                O     |
C |                      |
D |          O           |
E |    O                 |
F |                O     |
G | O                    |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #7 (e.g., B7): h10
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |        O             |
B |                O     |
C |                      |
D |          O           |
E |    O                 |
```

```
F |               O     |
G | O                   |
H |                   O |
I |                     |
J |                     |
  +---------------------+
Enter position to fire torpedo #8 (e.g., B7): i5
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O             |
B |               O     |
C |                     |
D |         O           |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |                     |
  +---------------------+
Enter position to fire torpedo #9 (e.g., B7): j3
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O             |
B |               O     |
C |                     |
D |         O           |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #10 (e.g., B7): b3
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O             |
B |     O         O     |
C |                     |
D |         O           |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #11 (e.g., B7): c1
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O             |
```

```
B |     O         O     |
C | O                   |
D |         O           |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #12 (e.g., B7): a9
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O           |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #13 (e.g., B7): d8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O     O     |
E |   O                 |
F |               O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #14 (e.g., B7): f5
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O     O     |
E |   O                 |
F |         O     O     |
G | O                   |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #15 (e.g., B7): g3
```

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O     O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |                   O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #16 (e.g., B7): h2
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O     O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O           |
J |     O               |
  +---------------------+
Enter position to fire torpedo #17 (e.g., B7): i8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O                   |
D |         O     O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #18 (e.g., B7): c6
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O       X           |
D |         O     O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
```

```
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #19 (e.g., B7): d6
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O         X         |
D |         O O   O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #20 (e.g., B7): c7
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O         X X       |
D |         O O   O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #21 (e.g., B7): c8
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O         X X X     |
D |         O O   O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #22 (e.g., B7): c9
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O         X X X X   |
D |         O O   O     |
```

```
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #23 (e.g., B7): c10
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O         X X X X O |
D |         O O   O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #24 (e.g., B7): c5
Hit... nice shot!
Congratulations! You sank my battleship!!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O       X X X X X O |
D |         O O   O     |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #25 (e.g., B7): d9
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |       O         O   |
B |     O         O     |
C | O       X X X X X O |
D |         O O   O X   |
E |   O                 |
F |         O     O     |
G | O   O               |
H |   O               O |
I |         O     O     |
J |     O               |
  +---------------------+
Enter position to fire torpedo #26 (e.g., B7): d10
Miss...
    1 2 3 4 5 6 7 8 9 10
```

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
  +--------------------+
A |       O         O  |
B |     O         O    |
C | O       X X X X X O |
D |         O O   O X O |
E |   O                |
F |         O     O    |
G | O   O              |
H |   O              O |
I |         O     O    |
J |     O              |
  +--------------------+
Enter position to fire torpedo #27 (e.g., B7): e9
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +--------------------+
A |       O         O  |
B |     O         O    |
C | O       X X X X X O |
D |         O O   O X O |
E |   O             X  |
F |         O     O    |
G | O   O              |
H |   O              O |
I |         O     O    |
J |     O              |
  +--------------------+
Enter position to fire torpedo #28 (e.g., B7): f9
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +--------------------+
A |       O         O  |
B |     O         O    |
C | O       X X X X X O |
D |         O O   O X O |
E |   O             X  |
F |         O     O X  |
G | O   O              |
H |   O              O |
I |         O     O    |
J |     O              |
  +--------------------+
Enter position to fire torpedo #29 (e.g., B7): g9
Hit... nice shot!
Congratulations! You sank my aircraft carrier!!
    1 2 3 4 5 6 7 8 9 10
  +--------------------+
A |       O         O  |
B |     O         O    |
C | O       X X X X X O |
D |         O O   O X O |
E |   O             X  |
F |         O     O X  |
G | O   O           X  |
H |   O               O |
I |         O     O    |
```

```
J |     O               |
  +---------------------+
Congratulations! You sank both ships in 29 tries!
mat0299@faculty:~/csce1030$
```

Here is more sample input and output, this time for an unsuccessful attempt:

```
mat0299@faculty:~/csce1030$ ./ship.out
+-------------------------------------------------------------+
|              Computer Science and Engineering               |
|               CSCE 1030 - Computer Science I                |
|          Student Name     EUID    euid@my.unt.edu           |
+-------------------------------------------------------------+

                Welcome to Battleship!

Enter difficulty level of game (easy, normal, hard): hard

+-------------------------------------------------------------+
| The computer program will randomly assign an aircraft car-  |
| rier and a battleship, that are oriented either vertically  |
| or horizontally, to the board. You will have 20 chances to  |
| sink both the computer's aircraft carrier and battleship!!  |
| You'll play on a 10 x 10 board, where the aircraft carrier  |
| will have a length of 5 units and the battleship will have  |
| a length of 4 units.                                        |
+-------------------------------------------------------------+

Initializing board... now let's begin!

    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |                     |
B |                     |
C |                     |
D |                     |
E |                     |
F |                     |
G |                     |
H |                     |
I |                     |
J |                     |
  +---------------------+
Enter position to fire torpedo #1 (e.g., B7): B4
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |                     |
B |       O             |
C |                     |
D |                     |
E |                     |
F |                     |
G |                     |
H |                     |
```

```
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #2 (e.g., B7): a8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |        O             |
C |                      |
D |                      |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #3 (e.g., B7): D99
Torpedo cannot be fired at D99. Try again...
Enter position to fire torpedo #3 (e.g., B7): D9
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |        O             |
C |                      |
D |                  O   |
E |                      |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #4 (e.g., B7): e3
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |        O             |
C |                      |
D |                  O   |
E |     O                |
F |                      |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #5 (e.g., B7): f6
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |        O             |
```

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
C |                      |
D |                  O   |
E |     O                |
F |           O          |
G |                      |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #6 (e.g., B7): K3
Torpedo cannot be fired at K3. Try again...
Enter position to fire torpedo #6 (e.g., B7): g1
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |       O              |
C |                      |
D |                  O   |
E |     O                |
F |           O          |
G | O                    |
H |                      |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #7 (e.g., B7): h9
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |       O              |
C |                      |
D |                  O   |
E |     O                |
F |           O          |
G | O                    |
H |                  O   |
I |                      |
J |                      |
  +----------------------+
Enter position to fire torpedo #8 (e.g., B7): i4
Miss...
    1 2 3 4 5 6 7 8 9 10
  +----------------------+
A |                O     |
B |       O              |
C |                      |
D |                  O   |
E |     O                |
F |           O          |
G | O                    |
H |                  O   |
I |       O              |
J |                      |
  +----------------------+
```

```
Enter position to fire torpedo #9 (e.g., B7): j7
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |                 O   |
B |       O             |
C |                     |
D |                   O |
E |     O               |
F |           O         |
G | O                   |
H |                   O |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #10 (e.g., B7): a3
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |     O         O     |
B |       O             |
C |                     |
D |                   O |
E |     O               |
F |           O         |
G | O                   |
H |                   O |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #11 (e.g., B7): a2
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |                     |
D |                   O |
E |     O               |
F |           O         |
G | O                   |
H |                   O |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #12 (e.g., B7): c6
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |           O         |
D |                   O |
E |     O               |
F |           O         |
G | O                   |
```

```
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #13 (e.g., B7): c2
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |                 O   |
E |     O               |
F |           O         |
G | O                   |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #14 (e.g., B7): D2
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |     O               |
F |           O         |
G | O                   |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #15 (e.g., B7): E2
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |   X O               |
F |           O         |
G | O                   |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #16 (e.g., B7): F2
Hit... nice shot!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
```

```
D |   X             O   |
E |   X O               |
F |   X       O         |
G | O                   |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #17 (e.g., B7): G2
Hit... nice shot!
Congratulations! You sank my aircraft carrier!!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |   X O               |
F |   X       O         |
G | O X                 |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #18 (e.g., B7): F6
Wasted shot... already fired torpedo at this location!
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |   X O               |
F |   X       O         |
G | O X                 |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #19 (e.g., B7): F8
Miss...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |   X O               |
F |   X       O   O     |
G | O X                 |
H |                 O   |
I |       O             |
J |             O       |
  +---------------------+
Enter position to fire torpedo #20 (e.g., B7): h5
Miss...
```

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O         |
D |   X             O   |
E |   X O               |
F |   X       O   O     |
G | O X                 |
H |         O       O   |
I |       O             |
J |             O       |
  +---------------------+
Sorry, but you were not able to sink my ships! Tough break...
    1 2 3 4 5 6 7 8 9 10
  +---------------------+
A |   O O         O     |
B |       O             |
C |   X       O       B |
D |   X             O B |
E |   X O             B |
F |   X       O   O   B |
G | O X                 |
H |         O       O   |
I |       O             |
J |             O       |
  +---------------------+
mat0299@faculty:~/csce1030$
```

Your functions should receive as arguments only the minimally needed ones of the appropriate type, and should a value of the appropriate type whenever a return value is needed.

Extra Credit Opportunity:

For students who have completed all requirements, you may add the option to “save” the game so that it can be resumed at a later time. This would entail saving the game board (with all statuses indicated), the number of torpedo shots fired, and the number of hits on each ship. This information may be written to a file in any format you choose (perhaps binary so it is not easily readable that could allow the user to view the solution?). Then, when the program is run again, you can check if the user wants to resume the previous game and if so, open the file (if it exists) and load the data into memory to continue the game. Please note that unless you have completed all other requirements, no credit will be given for trying this extra credit. In other words, make sure your program is complete before attempting this extra credit.

Design:

On a piece of paper, write down in English the sequence of steps you will perform to solve the problem. Pretend this is a “recipe” for someone else to follow. Refine your “recipe” until it is clear. Be sure to include the steps for prompting for input, etc. This

document should contain the sequence of steps used and some verification of what you did to ensure that your design worked.

Type these steps into a document (Word, txt, PDF, etc.). Also be sure to include your algorithm steps as comments in your code file. Do this before you start coding as completing it afterwards does not help you in learning the design process!

Implementation:

Now that you have a working design, your next step is to translate these steps into C code. Use the algorithm development techniques discussed in class to implement your solution to the problem above. Add your C code a little at a time, and compile and test as you go.

Remember to add your comments to your code to explain your program. Do this before/during programming instead of waiting until the end. At a minimum, you should comment the header (e.g., name, class, date, brief description of the program, etc.), all variables (i.e., what they are used for), and specific "blocks" of code. For example, use comments to describe the inputs, the formulas used, and any other important steps in your code.

Your program will be graded based largely upon whether it works correctly on a CSE Department machine, so you should make sure your program compiles and runs on a CSE machine.

Your program will also be graded based upon your programming style. At the very least, your program should include:

- A consistent indentation style as recommended in the textbook and in class;
- Meaningful variable names;
- A block header comment section that includes: your name, e-mail address, and a brief description of the program.
- Good function headers as described below.

Documentation:

When you have completed your C program, write a short report (2 – 3 paragraphs) describing what the objectives were, what you did to solve the problem, and the status of the program. Does it work properly for all test cases? Are there any known problems?

You will also include an example of your program working. To do so, you will use the "script" command with no parameters so that the output is saved to a file called "typescript".

Save this report in a separate file to be submitted electronically. You should also include any specific instructions required to compile or execute your code, such as linking a specific library (e.g., "`-lm`" for the math library, or "`-std=c99`", etc.).

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

Testing:

Test your program to check that it operates as desired with a variety of inputs, including any boundary conditions. Compare the answers your code gives with the ones you get from hand-calculations.

Homework Submission:

In this class, we will be using electronic homework submission to make sure that all students hand their programming projects (and labs) on time. You will submit your program source file to the class website through the "**Homework 7**" drop box by the due date and time.

Note that this project must be done individually. The program will be checked using a code plagiarism tool against other solutions, so please ensure that all work submitted is your own.

Note that the dates on your electronic submission will be used to verify that you met the due date above. All homework up to 24 hours late will receive a 50% grade penalty. Later submissions will receive zero credit, so hand in your best effort on the due date.

Summary:

- You will design a solution to the problem.
- You will implement it on the CSE machines using C. You will make sure to use good style, good variable names, indentation, etc. You will compile, run, and test your code.
- You will write a brief report describing what your code does and how well it works.
- You will submit electronically your C code, your design, and your brief report.

General Guidelines (for ALL of your programming assignments):

- Your program's output should initially display the department and course number, program number, your name, your EUID, and your e-mail address.
- Use meaningful variable names.
- Use appropriate indentation.
- Use comments, including a header. Example header:

```
/*
Author: Jane Doe (Jane.Doe@my.unt.edu)
Date: 9/18/2014
Purpose: This program reads in three numbers and computes their
average
*/
```

- Add a header to each function. Example function header:

CSCE 1030 – Homework 7

Due: 11:59 PM on Wednesday, December 3, 2014 CST

```
/*
Function: deposit
Parameters: a double representing the account balance,
and a double representing the deposit amount
Return: a double, the account balance after the deposit
This function computes the account balance after a deposit
*/
```