

CSE 5A

Introduction to Programming I (C)

Homework 3

Read Chapters 4 & 5

Due: Friday, October 19 by 6:00pm

All programming assignments must be done **INDIVIDUALLY** by all members of the class. Start early to ensure you have enough time to submit your program before the deadline.

All assignments will be automatically collected from your computer account at precisely 6:00 pm on the due date shown above. These due dates and the time will be rigidly applied. An assignment that is not in place at 6:00pm on the due date will not be collected and therefore will not be graded, receiving a score of 0. If you have any questions/problems with the turn-in, see one of the tutors, TA, or the instructor.

All your programs must be neat and legible. Indent and comment your programs as shown in the text and as described in class. Make sure to thoroughly understand the assignment before you start on it. It is a good idea to verify your understanding of the problem with the tutors, TA, or instructor. For maximum credit, read and follow the style rules given in the **CSE 5A Program Grading** document (<http://www.gregmiranda.com/wp-content/uploads/2018/08/CSE-5A-Program-Grading.pdf>).

Getting Started

In the lab, log into the Windows computer using your cs5af account (not your UCSD account).

Using Visual Studio 2017, create a new project (File->New->Project...) and select the Visual C++ Empty Project. Change the **Name** of the project to HW3 (note the uppercase HW3). Change the **Location** of the project to your cs5af Home Directory (H:\). After changing the name and the location, click on the OK button.

In the Solutions Explorer window, create a new file by right clicking on the HW3 solution and selecting Add->New Item... from the context menu. Next, select C++ File (.cpp). Change the **Name** of the file to hw3.c. You do not need to change the location, it should default to your HW3 folder inside the HW3 project (H:\HW3\HW3\). After changing the name, click the Add button. Make sure to save everything (File->Save All).

Link to a video for creating a new project and source file: <http://www.gregmiranda.com/cse5a-new-project>

Feel free to ask the tutors on duty in the lab for help.

Program Description

Homework 3 (hw3.c) will be a simple calculator. The program will use a menu system to allow the user to select which math operations to perform on the current value. All calculator values should be of type double. The program will also have user input (**scanf()**), conditional (**if-else**, **switch**), and looping (**do-while** loop).

Example Execution of the Program (user input is in bold):

Calculator

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **5**

Value: 5.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **2**

Subtract: **3**

Value: 2.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **3**

Multiply: **10**

Value: 20.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **4**

Divide: **4**

Value: 5.000000

- 1) Add

- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **5**
Squaring value

Value: 25.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **6**
Clearing value

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **q**
Exiting...

Less than 10 valid command have been entered

Press ENTER to exit!

Program Functionality

The program will first display the title of the program: **Calculator**. Next, in a loop, the program will display the current value of the calculator and the menu:

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]:

The program will continue until the user enters a 'Q' or 'q'. If the user enters an invalid command, display an error message: **Error: invalid command**.

Quiz Command:

Display **Exiting...** to the screen and exit the do-while loop.

Add Command:

Ask the user for a value to add. Add that value with the current value.

Subtract Command:

Ask the user for a value to subtract. Subtract that value with the current value.

Multiply Command:

Ask the user for a value to multiply. Multiply that value with the current value.

Divide Command:

Ask the user for a value to divide. If the number is not 0, divide that value to the current value. If the number is 0, display an error message: **Error: divide by 0 not allowed**.

Square Command:

Display a message to the user: **Squaring value** and square the current value (multiply it by itself).

Clear Command:

Display a message to the user: **Clearing value** and set the current value to 0.

Keep a running count of how many valid commands have been entered. Do not count Quit command, divide by 0, or invalid commands in the running count.

After the loop has exited, check the count and display one of three options:

If the count is 10 or larger, display: **10+ valid commands have been entered**

If the count is greater than 0 and less than 10, display: **Less than 10 valid command have been entered**

If the count is 0, display: **No valid commands have been entered**

Finally, display **Press ENTER to exit!** to the screen and wait for the user to hit enter before finally exiting the program.

Make sure match the spacing between lines as seen in the sample program and the example executions.

Notes:

Whenever you read an input value with `getchar()` or `scanf()`, be sure to deal with the newline character by inserting a `getchar();` as the next statement to absorb the newline character.

```
scanf( "%c", &ch );  
getchar(); /* Eat the newline char. */
```

```
scanf( "%lf", &temperature );  
getchar(); /* Eat the newline char. */
```

Make sure you have your name and cs5af account number in the header comment of hw3.c.

Note: replace "XX" in the Login: "cs5afXX" with your unique login name.

```
/*
 * Name: Jane-Joe LastName
 * Login: cs5afXX
 * Date: Month Day, Year
 * File: hw3.c
 * Sources of Help:

 * General description of the program ...
 */

#pragma warning(disable:4996)           //Disable security warnings
#include <stdio.h>
```

Make sure to include the #pragma warning line after the program header or your program will not compile in Visual Studio.

Comment your program like the previous programs (and the Program Grading guide). Make sure to use meaningful comments.

More Sample Executions

----- Test Execution -----

Calculator

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **1**

Value: 1.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **2**

Value: 3.000000

- 1) Add
- 2) Subtract

- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **3**

Value: 6.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **4**

Value: 10.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **5**

Value: 15.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **6**

Value: 21.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **7**

Value: 28.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **8**

Value: 36.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **9**

Value: 45.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **1**

Add: **10**

Value: 55.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **q**

Exiting...

10+ valid commands have been entered

Press ENTER to exit!

----- Test Execution -----

Calculator

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **4**

Divide: **0**

Error: divide by 0 not allowed

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **7**

Error: invalid command

Value: 0.000000

- 1) Add
- 2) Subtract
- 3) Multiply
- 4) Divide
- 5) Square
- 6) Clear

Enter command [Q/q to quit]: **Q**

Exiting...

No valid commands have been entered

Press ENTER to quit!

You can download an example executable for Homework 3 from the following link:

<http://www.gregmiranda.com/cse5a-hw3-sample>

Verify you saved your work in the cs5af HOME directory (H:\HW3\hw3.c or H:\HW3\HW3\hw3.c).