Part 1

1. Description

The first part of this lab involved the coding and testing of the *double_in()* function. This function takes a user's keypad input and tests it to ensure it is a valid input that can be converted into a double precision floating point number. The tests run on the input are as follows:

- No input; ENTR only received
- Double "-" sign at the beginning of the number
- Double decimal point ".." entered
- Invalid keys pressed (UP and DOWN keys, which correspond to "[" and "]" character inputs)

2. Testing

Several incorrect and correct inputs were entered in order to test this function. Below is an abbreviated list of test entries entered on the keypad.

Input	**Error (Y/N)**	**Error Message Printed (Y/N)**
--5.0 ENTR	Y	Y
5..5 ENTR	Y	Y
-5.5 ENTR	N	N
3..0 ENTR	Y	Y
3.3 ENTR	N	N
UP "[" ENTR	Y	Y
DOWN "]" ENTR	Y	Y
ENTR	Y	Y
--4 ENTR	Y	Y
-4 ENTR	N	N
----------	Additional Tests Run	----------

3. Results

All of the required error messages were thrown for their respective inputs and correct inputs passed through as expected. It should be noted, however, that there still exists some error cases that were not addressed in the function. For example, “-3.4.3” was entered and no error message was issued. Additional error conditions should be included into the function to improve the accuracy of the error detection protocol.

Part 2

1. Description

The main task for this part of the lab is the coding and implementation of the *printf_lcd()* function. This function is used frequently by the *double_in()* and *main()* functions and is responsible for displaying a desired output on the provided LCD screen.

Hierarchy After Part 2:

```
Main
|_MyRio_Open()                  // Opens a session with the MyRio
|_printf_lcd()                  // Prints formatted string to LCD screen
|       |_va_start()            // Macro for variable argument list
|       |_vsnprintf()           // Creates buffer string for use by putchar_lcd()
|       |_va_end()              // Macro for variable argument list
|       |_putchar_lcd()         // Prints character to LCD display
|_double_in()                   // Tests for correct double entry by user
|       |_printf_lcd()          // Prints formatted string to LCD screen
|       |_fgets_keypad()        // Captures keypad input by user
|       |_strpbrk()             // Detects character from “stopset”
|       |_strstr()              // Searches haystack string for needle fragment
|       |_sscanf()              // Converts string to double and stores in return var
|_MyRio_Close()                 // Closes the session with the MyRio
```

*Note: printf_lcd() is called frequently, but is only referenced once per section above.

2. Testing

The function was temporarily named *printf_lcd2()* for initial testing to ensure that the ME 477 library version of the function was not being mistakenly used in place of the one under development. Similar inputs to those seen in the table from Part 1 were used for testing the performance of this function.

3. Results

The output displayed on the LCD screen was correct and as expected for the given tests developed in Part 1 and the intended output format.