CSCI 1320 Computer Science I: Engineering Applications – Fall 2018

Instructor: Zagrodzki

Lab 1 - Due Friday, September 14, by 6pm

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**Objectives:** writing a MATLAB program/script

* Understand problem description
* Design your program:
  + being able to come up with a step by step algorithm,
  + convert the algorithm to pseudocode
  + imagine possible scenarios and corresponding sample runs
* Convert the pseudocode into a program written in the MATLAB programming language

**Calculator+**

**Task 1:** Problem description: we want to write a program that takes two numbers as floating point, then prints out the results of

* + adding them together
  + subtracting the second from the first
  + multiplying them together
  + dividing the first by the second
  + the first to the power of the second

At this point, do NOT write the program.

* Here is one possible sample run:

Enter first number: 23.0

Enter second number: 10

23.0 + 10.0 = 33.0

23.0 - 10.0 = 13.0

23.0 \* 10.0 = 230.0

23.0 / 10.0 = 2.3

23.010 = 4.1427e+13

* Come up with two more possible sample runs (i.e. pick test values and calculate expected results for each.

Enter first number: 5.0

Enter second number: 3.0

5.0 + 3.0 = 8.0

5.0 – 3.0 = 2.0

5.0 \* 3.0 = 15.0

5.0 / 3.0 = 1.6666

5.03 = 125.0

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Enter first number: 12.0

Enter second number: 1.5

12.0 + 1.5 = 13.5

12.0 – 1.5 = 10.5

12.0 \* 1.5 = 18.0

12.0 / 1.5 = 8.0

12.01.5 = 41.5692

**Task 2:** Fill in the values in the table below. The Expected Outputs column should contain 5 values, corresponding to the expected output from the calculator program for each of the 5 operations, given the inputs in every case. Use a calculator as needed.

|  |  |  |
| --- | --- | --- |
| **Description** | **Inputs** | **Expected Outputs** |
| **Normal cases** | | |
| two positive numbers | 15, 7 | 22, 8, 105, 2.1429, 1.7086\*108 |
| two negative numbers | -8, -123 | -131, 115, 984, 6.5041\*10-2, -8.316\*10-112 |
| one positive and one negative number | 5, -20 | -15, 25, -100, -0.2500, 1.0486\*10-14 |
| two positive numbers both with fractions | 4.5, 9.2 | 13.7, -4.7, 41.4, 4.8913\*10-1, 1.0223\*106 |
| one positive and one negative number both with fractions | 3.2, -4.5 | -1.3, 7.7, -14.4, -7.111\*10-1, 5.3312\*10-3 |
| one whole number and one number with fraction | 4, 3.2 | 7.2, 0.8, 12.8, 1.25, 84.4485 |
| **Error case for zero** | | |
| first number is zero, second is zero | 0, 0 | 0, 0, 0, error, 1 |
| first number is zero, second is not zero | 0, 5 | 5, -5, 0, 0, 0 |
| first number is not zero, second number is zero | 5, 0 | 5, 5, 0, error, 1 |
| **Special input case of one** | | |
| first number is one, second number is not one | 1, 5 | 6, -4, 5, 0.2, 1 |
| first number is not one, second number is one | 5, 1 | 6, 4, 5, 5, 5 |
| **Causing one of results to be zero without inputs being zero** | | |
| first number equals second number | 5, 5 | 10, 0, 25, 1, 3125 |

**Task 3:** Based on the program description, write pseudocode to accomplish the desired outputs.

Take inputs for two floating point numbers.

Output the first number plus the second number.

Output the first number minus the second number.

Output the first number times the second number.

Output the first number divided by the second number.

Output the first number to the power of the second number.

**Task 4:** Write the program. Create a Matlab script to do what is described above. Name your script *<lastname><Firstname>CalcScriptA.m*. The program needs a header and it should have documentation (comments) in the code. The header should contain your name, section, email address (colorado.edu). State a purpose to the program at the top in a comment.

Run the test cases from the table at Task 2 to make sure your implementation is correct. For now, *hardcode* (look up this term if you don’t know what it means)the values inside of your program (you will change the values to test different scenarios.) Your program's output should look like the sample run. Don't worry if some of your answers have more than 1 decimal point.

**Submitting the assignment:**

Download the .docx (Wordfile) version of the lab description. Add your name and student ID at the top. Fill in your answers for Tasks 1, 2 and 3 using a text editor (Word, Google Docs, etc.). Convert the text file to pdf and save it as <first\_name>.<last\_name>\_Lab2.pdf. Your archive (zip) submission file should contain one .pdf file and one .m file with your program solution. Submit the archive filethrough Moodle as Lab 1 by due date.