



ENSC 180 D100 – Introduction to Engineering Analysis (3 sem. hrs.)
Spring 2023
Lab 5 – Complex Number

Assigned	Tuesday Feb 14, 2023 @ 12:30pm
Due	Tuesday Feb 14, 2023 @ 14:20pm
Estimated time require	70 minutes

This is an individual assignment.

- You may consult with the TA about any aspect of the assignment.
- TA will only guide a general way, e.g., about debugging or MATLAB issues or questions about the wording on the assignment.
- Do not ask other students about this lab. You cannot actively work with another student on this assignment.
- Do not consult the Internet for a solution. Do your work.
- By submitting this work, you confirm you have read and followed these instructions.

I. Specifications

There are two parts. You need to submit your work for part A and B in a separate assignment container in Canvas.

Part A:

Generate a script that displays the magnitude and phase angle in degrees of a complex number. The display to the command window should look like the following:

```
Enter the real part of a complex number: -7
Enter the imaginary part of a complex number: 13
The magnitude and phase of -7 + 13i is
Magnitude = 14.7648 Phase angle = 118.3008 degrees
```

Part B:

The following is a skeleton of some MATLAB code. Modify the MATLAB code below to create a function that calculates the phasor for the sum of two sinusoids represented by phasors.

```
function [A3,phi3] = PhasorAdd(A1,phi1,A2,phi2)
% Usage [A3,phi3] = PhasorAdd(A1,phi1,A2,phi2)
% Calculates the phasor for the sum of two phasors.
```

```

% A1, phi1 = magnitude and phase shift in degrees of 1st sine
wave (note the 1st phase is "phi one")
% A2, phi2 = magnitude and phase shift in degrees of 2nd sine
wave
% A3, phi3 = magnitude and phase shift of sum of sinusoids

% Calculate the phasor sum.

% Find the magnitude of the phasor for the sum.

% Find the phase angle of the phasor for the sum.

```

Use the function from part (b) to calculate the sum of the following two sinusoids. Add code to obtain the information for the signal and also plot the resulting sinusoid.

$$6\cos(200\pi t + 60^\circ) + 8\cos(200\pi t - 30^\circ)$$

You may find the following page for creating a function in MATLAB to be useful

<https://www.mathworks.com/help/matlab/ref/function.html>

II. Deliverables

Use the following as the header of each MATLAB source file. You need to replace the text in “< >” with the appropriate information.

```

#####
% <Lab 5>
%
% Course: ENSC 180 Introduction to Engineering Analysis
% Instructor: Dr. Herbert H. Tsang
% Description: <Give a brief description for homework 1>
% Due date: < DATE HERE, YOU CAN USE YYYY/MM/DD format>
%
% Author: < NAME >
% Input: < IF ANY>
% Output: < IF ANY >
% I pledge that I have completed the programming assignment independently.
% I have not copied the code from a student or any source.
% I have not given my code to any student.
%
% Sign here: ____<PUT DOWN YOUR NAME HERE>____
#####

```

Please consult this Coding Standard Document

<https://www.mathworks.com/matlabcentral/fileexchange/46056-matlab-style-guidelines-2-0>.

When you finished the work,

1. You should save your code for Part A as **lab5a_Lastname_Firstname.m**, the Part B as **PhasorAdd.m** and **lab5b_Lastname_Firstname.m** where **Lastname** is your family name,

and **Firstname** is your first name. Please capitalize the first letter of the Last and First name.

2. Submit the source code files at <http://canvas.sfu.ca> before the deadline. You should leave at least 10-15 minutes for submission. You can make one submission only.
3. **Remember to submit to the correct submission page (i.e. part 1a and part 1b had separate assignment submission page). Submitting to the wrong drop box will result zero marks in your work.**
4. You may leave quietly after your submitted your work. Do not communicate about this lab to other students before the deadline.

Appendix A: Rubric for marking

Criteria	Ratings			Pts
Program Specifications / Correctness	Excellent - No errors, program always works correctly and meets the specification(s). 50.0 pts	Adequate - Minor details of the program specification are violated, program functions incorrectly for some inputs. 40.0 pts	Poor - Significant details of the specification are violated, program often exhibits incorrect behavior. 30.0 pts	Not met - Program only functions correctly in very limited cases or not at all. 0.0 pts
Readability	Excellent - No errors, code is clean, understandable, and well-organized. 20.0 pts	Adequate - Minor issues with consistent indentation, use of whitespace, variable naming, or general organization. 16.0 pts	Poor - At least one major issue with indentation, whitespace, variable names, or organization. 12.0 pts	Not met - Major problems with at three or four of the readability subcategories. 0.0 pts
Documentation	Excellent - No errors, code is well-commented. 20.0 pts	Adequate - One or two places that could benefit from comments are missing them or the code is overly commented. 16.0 pts	Poor - File header missing, complicated lines or sections of code uncommented or lacking meaningful comments. 12.0 pts	Not met - No file header or comments present. 0.0 pts
Code Efficiency	Excellent - No errors, code uses	Poor - Code uses poorly-chosen	Not met - Many things in the code could have been accomplished in an easier,	5.0 pts

Criteria	Ratings			Pts
	the best approach in every case. 5.0 pts	approaches in at least one place. 3.0 pts	faster, or otherwise better fashion 0.0 pts	
Assignment Specifications	No errors 5.0 pts	Minor details of the assignment specification are violated, such as files named incorrectly or extra instructions slightly misunderstood 3.0 pts	Significant details of the specification are violated, such as extra instructions ignored or entirely misunderstood 0.0 pts	5.0 pts
Total Points: 100.0				

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