

Homework #1 Sinusoidal Signals

Assigned on Friday, August 27, 2021

Due on Friday, September 3, 2021, by 11:59 pm via Canvas submission

Late homework is subject to a penalty of two points per minute late.

Reading: McClellan, Schafer and Yoder, *Signal Processing First*, 2003, Ch. 1 & 2. [Errata](#).
 Companion Web site with demos and other supplemental information: <http://dspfirst.gatech.edu/>
 Web site contains solutions to selected homework problems from *DSP First*.

E-mail address for Mr. Faris Tabbara (TA) is firas.tabbara@utexas.edu. Lecture hours and office hours for Mr. Tabbara and Prof. Evans on Zoom (see links on the [Canvas](#) calendar) follow:

<i>Time Slot</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9:30 am				Evans (Zoom)	
10:00 am				Evans (Zoom)	
10:30 am					
11:00 am		Evans (EER 1.516)		Evans (EER 1.516)	
11:30 am		Evans (EER 1.516)		Evans (EER 1.516)	Evans (Zoom)
12:00 pm		Evans (EER 1.516)		Evans (EER 1.516)	Evans (Zoom)
12:30 pm		Evans (Zoom)			
1:00 pm		Evans (Zoom)			
1:30 pm					
2:00 pm					Evans (Zoom)
2:30 pm					Evans (Zoom)
3:00 pm					Tabbara (Zoom)
3:30 pm			Tabbara (Zoom)		Tabbara (Zoom)
4:00 pm			Tabbara (Zoom)		Tabbara (Zoom)
4:30 pm			Tabbara (Zoom)		

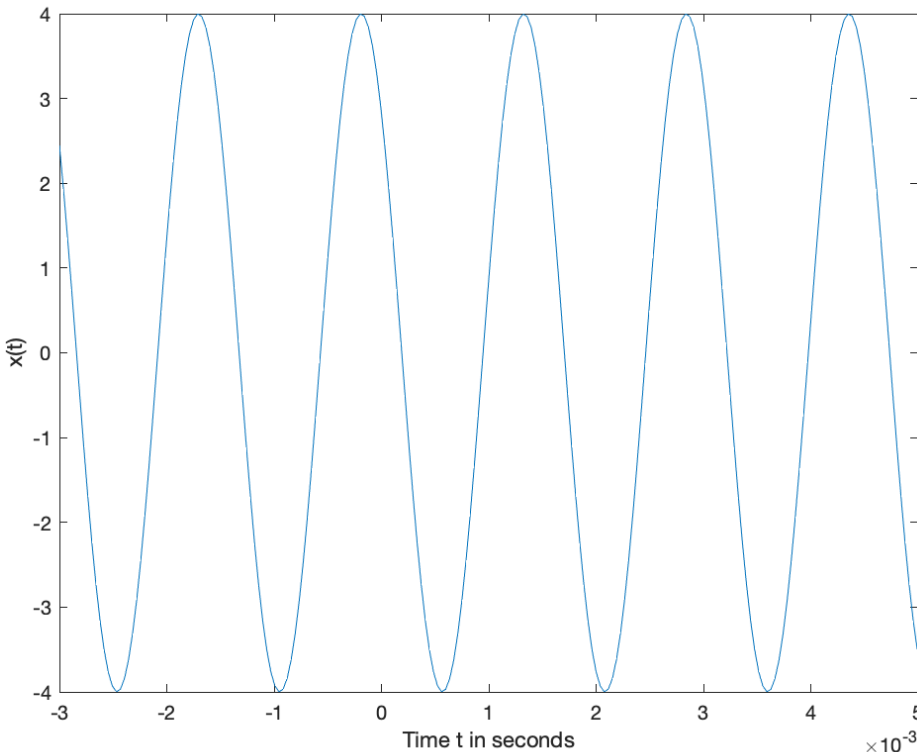


Prof. Evans is holding coffee/advising hours on Fridays 12-2pm at the EERC café during the fall semester from Aug. 27th to Dec. 3rd inclusive except Nov. 26th (due to the Thanksgiving Holidays).

Feel free to stop by any Friday.

1. Finding Parameters of a Sinusoidal Waveform from a Plot. 20 points.

Signal Processing First, problem P-2.2, page 31, but use the plot below instead of the plot in Fig. P-2.2:



2. Using Phasors. 20 points.

Define $x(t) = 120 \cos(\omega_0 t) + 120 \cos(\omega_0 t + 30^\circ)$

- Express $x(t)$ in the form $x(t) = A \cos(\omega_0 t + \theta)$.
- Assume that $\omega_0 = 120\pi$ rad/s. Plot of $x(t)$ over the range $-0.05s \leq t \leq 0.05s$ in MATLAB. Please write and submit your MATLAB code.
- Find a complex-valued signal $z(t)$ such that $x(t) = \text{Re}\{z(t)\}$.

Based on Signal Processing First, problem P-2.9, page 32.

3. Time Shift Corresponds to a Phase Shift. 20 points.

Signal Processing First, problem P-2.16, page 33.

4. Mobile Radio System. 40 points.

Signal Processing First, problem P-2.21, pages 34-35. Please see the [book errata](#).

As stated on the course descriptor, "Discussion of homework questions is encouraged. Please be sure to submit your own independent homework solution."

NOTE: In your solutions, please put all work for problem 1 together, then all work for problem 2 together, etc. Please follow the other guidelines for your solutions on the homework page.