Fall 2018   EE 313 Linear Systems and Signals   Prof. Evans

Homework #9

Continuous-Time Frequency Response and Fourier Transforms

Assigned on Sunday, November 25, 2018
Due on Friday, November 30, 2018, by 10:59 pm via Canvas submission
Late homework is subject to a penalty of two points per minute late.

Reading: McClellan, Schafer & Yoder, *Signal Processing First*, 2003, Chapters 10-11.
Companion Web site with demos and other supplemental information: http://dspfirst.gatech.edu/
Web site contains solutions to selected homework problems from *DSP First*.

The e-mail address for Mr. Houshang Salimian (TA) is salimian.houshang@gmail.com.
Office hours for Mr. Salimian and Prof. Evans follow. Prof. is holding additional office hours on
WF 9:00-10:00am. His Wednesday afternoon office hours have changed to 1:00-2:00pm.

Time Slot	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
9:00 am			Evans (EER 6.882)		Evans (EER 6.882)
10:00 am					
11:00 am		Salimian (EER 0.814 Table #4)		Salimian (EER 0.814A)	Salimian (EER 0.814D)
12:00 pm		**Salimian (EER 0.814 Table #4)**		**Salimian (EER 0.814A)**	**Salimian (EER 0.814D)**
12:30 pm		**Evans (EER 1.516)**		**Evans (EER 1.516)**	**Salimian (EER 0.814D)**
1:00 pm		Evans (EER 1.516)	Evans (EER 6.882)	Evans (EER 1.516)	
2:00 pm		Evans (EER 6.882)		Evans (EER 6.882)	
3:00 pm		**Evans (EER 6.882)**	**Salimian (EER 1.810)**	**Evans (EER 6.882)**	
3:30 pm			**Salimian (EER 1.810)**		
4:00 pm			**Salimian (EER 1.810)**		
4:30 pm					

Prof. Evans' coffee hours this week will be 12:00-2:00pm on Friday in the EERC café.

EE 313 tutoring is available on Sundays through Thursdays from 7:00pm to 10:00pm in EER 0.814:

http://www.ece.utexas.edu/undergraduate/tutoring

1. Continuous-Time Frequency Response. *25 points.*

Signal Processing First, problem P-10.9, page 305. In addition, for each of the seven filters given, describe their frequency selectivity as lowpass, highpass, bandpass, bandstop, allpass, or notch.

2. Continuous-Time Fourier Transforms. 25 points.

Signal Processing First, problem P-11.4, page 342.   In addition, for parts (a), (b) and (d), describe the magnitude response shape of the signal as lowpass, highpass, bandpass, bandstop, allpass, or notch.

3. Continuous-Time Filtering. 25 points.

Signal Processing First, problem P-11.7, page 343.

Note: In part (c), the periodic impulse train can be used to model an idealized view of sampling. When sampling the continuous-time signal x(t) every T_s seconds, we ideally select the amplitude at each sampling time. This can be modeled mathematically in continuous time by multiplying x(t) by a series of continuous-time impulses (i.e. Dirac delta functionals) that are spaced apart by T_s seconds and occur at nT_s seconds where n is the sample index. This series of impulses is also known as a periodic "impulse train". Please the solution to homework problem 8.4 from fall 2017 at

http://users.ece.utexas.edu/~bevans/courses/signals/homework/fall2017/solution8.pdf

4. Continuous-Time Frequency Domain Symmetry. 25 points.

Signal Processing First, problem P-11.16, page 345. Note that problem P-11.9 is similar.

Although not graded, please review the solution to problem 8.3 from fall 2017 at

http://users.ece.utexas.edu/~bevans/courses/signals/homework/fall2017/solution8.pdf

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 see additional homework guidelines on the homework page.

Please read the homework guidelines at
http://users.ece.utexas.edu/~bevans/courses/signals/homework/index.html