Fall 2017   EE 313 Linear Systems and Signals   Prof. Evans

Homework #5

Frequency Response of FIR Filters and Z-Transforms

Assigned on Friday, October 13, 2017
Due on Friday, October 20, 2017, by 12:30 pm via Canvas submission

Late homework will not be accepted.

Reading: McClellan, Schafer & Yoder, *Signal Processing First*, 2003, Sec. 6.1-6.6 and 7.1-7.3.
Companion Web site with demos and other supplemental information: http://dspfirst.gatech.edu/
Web site contains solutions to selected homework problems from *DSP First*.

Location of TA office hours and Ms. Ghosh's e-mail address are given on Canvas at

https://utexas.instructure.com/files/43490184/download?download_frd=1

and you must already be logged into Canvas at canvas.utexas.edu for the above link to work

Office hours for Ms. Ghosh and Prof. Evans follow, as well as Prof. Evans' coffee hours on Friday.

Time Slot	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
9:00 am			Ghosh (EER 1.810)		
9:30 am			Ghosh (EER 1.810)		
10:00 am			Ghosh (EER 1.810)		
10:30 am					
11:00 am		Ghosh (EER 1.810)		Ghosh (EER 1.810)	
11:30 am		Ghosh (EER 1.810)		Ghosh (EER 1.810)	
12:00 pm		Ghosh (EER 1.810)		Ghosh (EER 1.810)	Evans (EER cafe)
12:30 pm		Evans (EER 1.516)		Evans (EER 1.516)	Evans (EER cafe)
1:00 pm		Evans (EER 1.516)	Evans (EER 6.882)	Evans (EER 1.516)	
1:30 pm		Evans (EER 1.516)	Evans (EER 6.882)	Evans (EER 1.516)	
2:00 pm			Evans (EER 6.882)	Evans (EER 6.882)	
2:30 pm				Evans (EER 6.882)	
3:00 pm				Evans (EER 6.882)	

EE 313 tutoring is available on Mondays through Thursdays from 7:00pm to 10:00pm in ETC 4.150:

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

1. Lowpass Filter. 25 points.

Signal Processing First, problem P-6.5, page 158.

In part (b), please derive the amplitude and phase functions from part (a) and submit a hand sketch and a MATLAB plot. For the MATLAB plot, the command `freqz` may be very helpful. Given a vector of the impulse response `h`, `freqz(h)` will plot the magnitude response (in dB) and the phase response of the LTI system. Please note that the magnitude response will be in deciBels: $A_{dB} = 20 \log_{10} A$.

2. Connection Between Impulse Response and Frequency Response. 25 points.

Signal Processing First, problem P-6.7, page 158.

3. Filtering. 25 points.

Signal Processing First, problem P-6.20, page 161.

4. Introduction to *Z*-transforms. 20 points.

Signal Processing First, problem P-7.1, page 191.

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.