Fall 2018 EE 313 Linear Systems and Signals Prof. Evans

Homework #8

# Continuous-Time Signals and Systems

Assigned on Saturday, November 10, 2018

Due on Friday, November 16, 2018, by 5:00 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, Chapter 9.

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](mailto:salimian.houshang@gmail.com).

Office hours for Mr. Salimian and Prof. Evans follow.

***Note the change in Prof. Evans’ Wednesday office hours from 2:00-3:00pm to 12:00-1:00pm***.

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| ***Time Slot*** | ***Monday*** | ***Tuesday*** | ***Wednesday*** | ***Thursday*** | ***Friday*** |
| **11:00 am** |  | **Salimian (EER 0.814 Table #4)** |  | **Salimian (EER 0.814A)** | **Salimian (EER 0.814D)** |
| **11:30 am** |  | **Salimian (EER 0.814 Table #4)** |  | **Salimian (EER 0.814A)** | **Salimian (EER 0.814D)** |
| **12:00 pm** |  | **Salimian (EER 0.814 Table #4)** | Evans (EER 6.882) | **Salimian (EER 0.814A)** | **Salimian (EER 0.814D)** |
| **12:30 pm** |  | Evans (EER 1.516) | Evans (EER 6.882) | Evans (EER 1.516) | **Salimian (EER 0.814D)** |
| **1:00 pm** |  | Evans (EER 1.516) |  | Evans (EER 1.516) |  |
| **1:30 pm** |  | Evans (EER 1.516) |  | Evans (EER 1.516) |  |
| **2:00 pm** |  | Evans (EER 6.882) |  | Evans (EER 6.882) |  |
| **2:30 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 from 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](http://www.ece.utexas.edu/undergraduate/tutoring" \t "_blank)

**1. Dirac Delta Blues. *25 points*.**

*Signal Processing First*, problem P-9.3, page 279. For part (b), please use

**2. Continuous-Time Averaging Filter. 25 points.**

*Signal Processing First*, problem P-9.17, page 282.

Please note that this system averages the input signal over a four-second interval of time from *t*-2 to *t*+2. If we were to multiply the result of the integral by ¼, then we would have a normalized averaging filter.

**3. Continuous-Time Filtering. 25 points.**

*Signal Processing First*, problem P-9.18, page 282. Please use *x*(*t*) = *u*(*t*) instead of *x*(*t*) = *u*(-*t*). Please plot *h*(*t*), *x*(*t*) and *h*(*t*) \* *x*(*t*).

By inputting a unit step function, we can obtain the step response. A step function models an event that was off before *t* = 0, turns on at *t* = 0 and stays on for *t* > 0. An example is turning on a light switch and leaving it on, or hitting the brake pedal and keeping the brake pedal pressed down.

**4. More Continuous-Time Filtering. 25 points.**

*Signal Processing First*, problem P-9.23, page 283.

Although not graded, please review the solution to problem 6.4 from fall 2017 at

<http://users.ece.utexas.edu/~bevans/courses/signals/homework/fall2017/solution6.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>