

THE UNIVERSITY OF TEXAS AT AUSTIN  
Dept. of Electrical and Computer Engineering

*EE313 Linear Systems and Signals*  
Problem Set #8: Fourier Transforms and Sampling

Prof. Brian L. Evans

Date assigned: October 21, 2010

Date due: October 28, 2010

*Homework is due at 11:00 am sharp in class. Late homework will not be accepted.*

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Reading: *Signals and Systems*, Sections 5.1–5.5

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You may use any computer program to help you solve these problems, check answers, etc.

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

The office hours in ENS 433B for Prof. Evans follow:

- Tuesdays 12:15pm–1:00pm (right after lecture)
- Wednesdays 12:30pm–2:00pm
- Thursdays 12:15pm–1:00pm (right after lecture)
- Fridays 9:30am–11:00am

In addition, Prof. Evans will be available for his coffee hour on Friday afternoon, October 22nd. Prof. Evans can be reached at [bevans@ece.utexas.edu](mailto:bevans@ece.utexas.edu).

The teaching assistant is Mr. Jackson Massey. His office hours will be on Wednesdays 4:00pm–7:00pm in ENS 138. Mr. Massey can be reached at [jackson.massey@gmail.com](mailto:jackson.massey@gmail.com).

The ECE Department is offering tutoring sessions for all basic sequence ECE courses, including EE 313, on Sundays through Thursdays, 7:00–10:00 pm, in ENS 314. Mr. Massey will be a tutor during the Monday and Wednesday evening sessions.

**Problem 8.1** Forward Fourier Transforms

Roberts, Ch. 5, Problem 42, parts (a), (d), (f) and (h).

**Problem 8.2** More Forward Fourier Transforms

Roberts, Ch. 5, Problem 46, parts (a), (b) and (c).

**Problem 8.3** Linear Time-Invariant System Analysis

Roberts, Ch. 5, Problem 41. The system is linear and time-invariant. Please answer the following questions:

- (a) Compute the impulse response.
- (b) Compute the frequency response of the system; i.e., find the Fourier transform of the impulse response
- (c) What is the frequency selectivity of the system? Lowpass, bandpass, bandstop, high-pass, all-pass or notch? Plot the magnitude of the frequency response to help justify your answer.

**Problem 8.4** Inverse Fourier Transforms

Roberts, Ch. 5, Problem 47.