

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

EE345S Real-Time Digital Signal Processing Laboratory
Problem Set #3: Amplitude and Angle Modulation

Date assigned: March 30, 2006

Date due: April 6, 2006

Homework is due at the beginning of class. Late homework will not be accepted.

Reading: Johnson & Sethares, ch. 8, 9, 11

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 sure to submit your own independent homework solution.”

TAs may be reached during the lab hours for the course to answer questions about homework problems if they are not busy with lab duties.

Problem 3.1 Pulse Shaping

Johnson & Sethares, problem 11.15

Problem 3.2 Eye Diagram

Johnson & Sethares, problem 11.5.

Problem 3.3 Discrete Fourier Transform

Run `waystofilt.m` on page 133 (Section 7.2) of Johnson & Sethares using

- $h[n]$ that is a four-symbol raised cosine pulse (4 samples/symbol)
- $x[n]$ that is a 6-PAM signal with $d = 1$ and 4 samples/symbol and defined as

$$\mathbf{x} = [-1 \ 0 \ 0 \ 0 \ -3 \ 0 \ 0 \ 0 \ -5 \ 0 \ 0 \ 0 \ 5 \ 0 \ 0 \ 0 \ 3 \ 0 \ 0 \ 0 \ 1 \ 0 \ 0 \ 0]$$

In particular, pay attention to the use of the fast Fourier transform to implement linear filtering. A similar trick is used in multicarrier communication systems, such as ADSL, VDSL, 802.11a/g wireless LAN (Wi-Fi), 802.16a fixed wireless communications (WiMax), terrestrial digital audio broadcast, and handheld and terrestrial digital video broadcast.

Problem 3.4 Correlation

Johnson & Sethares, problem 8.8.

Problem 3.5 Matched Filters

Johnson & Sethares, problem 9.7.