TE3302 Signals & Systems
Problem Set #1: Signals, Complex Numbers, and Sinusoids

Date assigned: August 30, 2000
Date due: September 6, 2000

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

Reading: *Signals & Systems*, ch. 1

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

Problem 1.1 Signals
   Problem 1.5 (please prove the answers) and Problem 1.21 ((a),(b),(c),(d)) in *Signals & Systems*.

Problem 1.2 Periodic Signals
   Problem 1.25 ((a),(c)) and Problem 1.26 ((a),(d)) in *Signals & Systems*

Problem 1.3 Review of Complex Numbers
   Evaluate and give the answer in both rectangular and polar form. In all cases, assume that $z_1 = -3 + j4$ and $z_2 = 1 + j$. Note that z^* is the complex conjugate of z. Hint: *You might consider using Matlab to check your answers.*

(a)	z_1^*	(b)	z_2^2	(c)	$z_1 + z_2^*$
(d)	$j z_2$	(e)	$z_1^{-1} = 1/z1$	(f)	z_1/z_2
(g)	$\exp z_2 \; (e^{z_2})$	(h)	$z_1 z_1^*$	(i)	$z_1 z_2$

Problem 1.4 Using Matlab to Plot Signals
   Matlab's strength is in performing matrix-vector calculations which are convenient for computing signals and test signal processing algorithms. In this problem, we will use Matlab for plotting signals. Submit a hardcopy of the following Matlab plot:

```
J = sqrt(-1);           %%% imaginary number
dt = 1/100;             %%% time increment
tt = -1 : dt : 1;       %%% vector [-1, -.99, ..., .99, 1]
Fo = 2;                 %%% frequency
xx = 100 * real(exp(J*(2*pi*Fo*(tt - 0.75))));
subplot(2,1,1);
plot(tt, xx), grid      %%% time-domain plot
title( 'Section of a sinusoid' ), xlabel('time (sec)')
```