**EECS 216 – Winter 2008**

**Homework #1 – Assigned Jan. 8 – Due Tuesday Jan. 15**

**Grading:** Not all problems will be graded, but you should do all of them.
**Submission:** Submit in *black box in room 4230 EECS* **before** 5 pm on Tuesday.
**Relevant Lectures:** January 8-10.
**Relevant Reading in Textbook:** Chapter 1 (elementary signals and operations); Appendix A (review (?) of complex numbers)

1. *(15 points: 5+5+5)* Consider the RLC circuit in Fig. P2.25 on p. 104.
   (a) Use complex impedance technique from EECS 215 to find the frequency response function $H(j\omega)$ from input $x(t)$ to output $y(t) = v_C(t)$.
   (b) Set $R = 0.1$, $C = 1$, and $L = 1$. Use Matlab to plot the magnitude and the phase of $H(j\omega)$ as a function of $\omega$; use Matlab's `freqs` or `bode`.

2. *(15 points: 5+5+5)* For the complex numbers $z_1 = 3 - 4j$ and $z_2 = 12 + 5j$:
   (a) Express $z_1$ in complex exponential (polar) form
   (b) Compute $(z_1 + z_2^*)^2$
   (c) Compute $z_1/z_2$

3. *(10 points)* Simplify as much as possible:
   $\sin(t) + \cos(t + 30^o) + \cos(t + 150^o)$

4. *(15 points: 3+3+3+3+3)* Text, #1.6 p. 35. Periodic signals.

5. *(15 points: 5+5+5)* Text #1.11(a),(b) p. 36. Scaling and shifting.
   For (b) do only $x(-3t - 2)$ and $x(\frac{2}{3}t + \frac{1}{2})$

6. *(15 points: 3+3+3+3+3)* Text #1.13(a),(b),(e),(f),(g) p. 36. Signal ops.

7. *(15 points: 5+5+5)* Text #1.16 p. 37 (only for $x_2(t)$, $x_4(t)$, $x_6(t)$).