EECS 210 Fall 00
Homework #11
Due(in class) Monday 12/4/00

Problems 2-8 are from chapter 14 of your textbook.
Unless explicitly stated otherwise assume that transfer functions are computed with the output open-circuited.

1. In your textbook read sections 14.6-14.7 and chapter 15.

2. Consider the low-pass series RC filter shown in Fig. 14. 7 in your textbook. Note in class we derived the transfer function of this filter when the output was open-circuited. In practice, however, the output will be connected to a load which has a finite impedance. Suppose the load is a resistor with resistance R_L.
   (a) Derive the transfer function of the filter with the load resistance present.
   (b) Find max $|H(\omega)|$.
   $\omega \geq 0$
   (c) Find the cut-off frequency (i.e., 3-dB power point).
   (d) Based on your answers above does loading affect the low-pass filter and if so in what ways?

3. 14.5. Use the low-pass filter shown in Fig. 14.7.

4. 14.10. Use the high pass filter shown in Fig. 14.10a.

5. 14.12. Note this problem has a typo. It should refer to Fig. P14.12 rather than Fig. 14.15.

6. 14.17. Note this is a loaded bandpass filter. R_L is the load resistance which is shown as 5 MΩ in the figure.
   Also when the filter is loaded with R_L = 5 MΩ (1) derive the transfer function; (2) using Matlab, plot $|H(\omega)|$ in dB vs $\log_{10}(\omega)$; and (3) using Matlab, plot the phase of $H(\omega)$ vs $\log_{10}(\omega)$.

7. 14.19

8. 14.27.
   Also using Matlab, plot $|H(\omega)|$ in dB vs $\log_{10}(\omega)$ and the phase of $H(\omega)$ vs $\log_{10}(\omega)$.