Problem set #1, Issued: Sept. 7, 2001
Due: Sept. 14, 2001, at beginning of lecture

1) Review EECS 210 Material (Nodal analysis, Freq. Response, Transfer functions, Bode plots)
2) Read Chapter 7 in Nilsson and Riedel

Problems:

#1 If you are given an input steady-state, sinusoidal voltage of \((190 \text{ mV}) \cos(6.28 \times 10^9 t + 30^\circ)\), what is the RMS voltage of this signal, and how far apart would the peaks of the sine wave appear on an oscilloscope?

#2 Given the following circuit
(a) Find the transfer function \(H(\omega)\) in terms of \(R_1, R_2, C_1, C_2,\) and \(\omega\). The denominator should reduce to the form \((1 + j\omega R_1 C_1) \cdot (1 + j\omega R_2 C_2)\). Assume an ideal op-amp.
(b) If \(R_1 = 5 \text{ k}\Omega, C_1 = 1 \mu\text{F}, R_2 = 10 \text{ k}\Omega,\) and \(C_2 = 0.1 \mu\text{F},\) then what is the magnitude and phase of the transfer function for \(\omega = 0, 500,\) and \(2500 \text{ rad/sec}\)? What type of filter does this appear to be, given these results?
(c) Now change \(C_2\) to \(0.01 \mu\text{F}\) and repeat part (b), all other quantities remaining the same.

#3 Nilsson & Riedel, problem 9.39
#4 Nilsson & Riedel, problem 7.10
#5 Nilsson & Riedel, problem 7.28, part (a) ONLY!