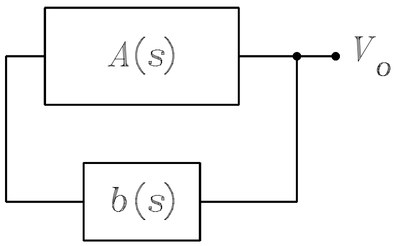
ECE 3050 Analog Electronics Quiz 14
November 25, 2009

Professor Leach Name______________________________________
Instructions. Print your name in the space above. Place a box around your answers. **Honor Code Statement:** *I have neither given nor received help on this quiz.* Initials ____________

1 of 2. (a) The block diagram of an oscillator is shown. For $s = j\omega$, what are the conditions on $A(s)$ and $b(s)$ for steady state oscillations? $A(j\omega)\,b(j\omega) = 1\angle 0^\circ$.
(b) If $A(\omega_0) = 5\angle 60^\circ$, what must be the phasor value of $b(j\omega_0)$ for steady-state oscillations at the frequency ω_0? $b(j\omega_0) = A^{-1}(j\omega_0) = 0.2\angle -60^\circ$



2 of 2. Draw the diagrams of circuits which can be used to realize the voltage-gain transfer functions given. It may be helpful to first draw the straight-line Bode magnitude plots. In the second through fourth transfer functions, assume that $\omega_1 < \omega_2$. You do not have to label the circuit elements or supply values for them.

$$\text{(a)}\ \frac{V_o}{V_i} = \frac{-5}{1+(s/\omega_1)} \qquad \text{(b)}\ \frac{V_o}{V_i} = +5\frac{1+(s/\omega_2)}{1+(s/\omega_1)}$$

$$\text{(c)}\ \frac{V_o}{V_i} = +5\frac{1+(s/\omega_1)}{1+(s/\omega_2)} \qquad \text{(d)}\ \frac{V_o}{V_i} = -5\frac{(s/\omega_1)}{1+(s/\omega_1)} \times \frac{1}{1+(s/\omega_2)}$$

(a) An inverting low-pass amplifier. An inverting op-amp amplifier with a capacitor in parallel with the feedback resistor R_F.
(b) A non-inverting low-pass shelving amplifier A non-inverting op-amp amplifier with a series RC in parallel with the series feedback resistor R_F.
(c) A non-inverting high-pass shelving amplifier. A non-inverting op-amp amplifier with a series RC in parallel with the shunt feedback resistor R_1.
(d) An inverting band-pass amplifier. An inverting op-amp amplifier with a capacitor C_F in parallel with the feedback resistor R_F and a series capacitor C_1 in series with the input resistor R_1.