EE4086 Quiz 2

MARCH 3, 1997

Professor Leach Name _____

Instructions. Print your name in the space above and on all quiz work sheets. Place a box around all answers. Write the word "over" if you continue your work on another page.

1. The op-amp in Fig. P1 is ideal. It is given that $R_1 = 1$ kΩ, $R_2 = 49$ kΩ, $R_3 = 4.36$ kΩ, and $C = 5.97$ nF.

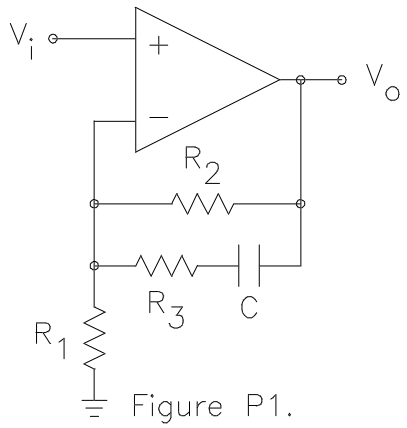

Figure P1.

   (a) Solve for the transfer function for V_o/V_i. Put it into the form

$$\frac{V_o}{V_i} = K\frac{1+\tau_2 s}{1+\tau_1 s}$$

   where you must specify K, τ_1, and τ_2.

   (b) Sketch the Bode magnitude plot for V_o/V_i. Label the asymptotic gains and the break frequencies in both rad/s and in Hz.

2. The op-amp in Fig. P2 is ideal. It is given that $R_1 = 10$ kΩ, $R_2 = 300$ kΩ, $R_3 = 10$ kΩ, $R_4 = 20$ kΩ, $R_5 = 10$ kΩ, $R_6 = 20$ kΩ, and $V_{CC} = 15$ V.

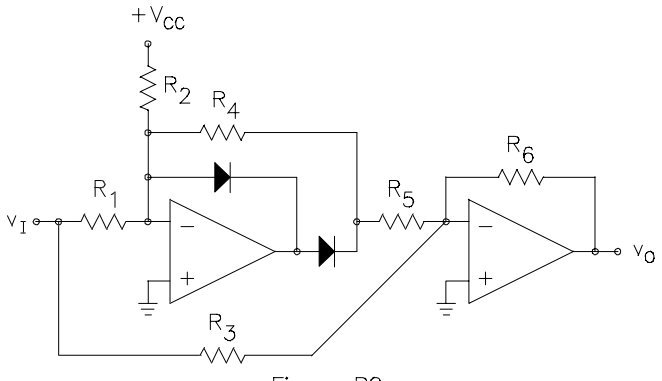

Figure P2.

   (a) Solve for v_O/v_I for $v_I/R_1 + V_{CC}/R_2 > 0$.

(b) Solve for v_O/v_I for $v_I/R_1 + V_{CC}/R_2 < 0$.

(c) Sketch the plot of v_O versus v_I.

(d) For $v_I = 4\sin\omega t$, sketch and label the waveform for $v_O(t)$.

3. The transfer function for V_o in the circuit of Fig. P3 is given by

$$V_o = \frac{A_o}{1 + s/\omega_o}(V_+ - V_-)$$

where $A_o = 10^5$ and $\omega_o = 20\pi$. It is given that $R_1 = 1$ kΩ, $R_2 = 10$ kΩ, and $R_F = 20$ kΩ.

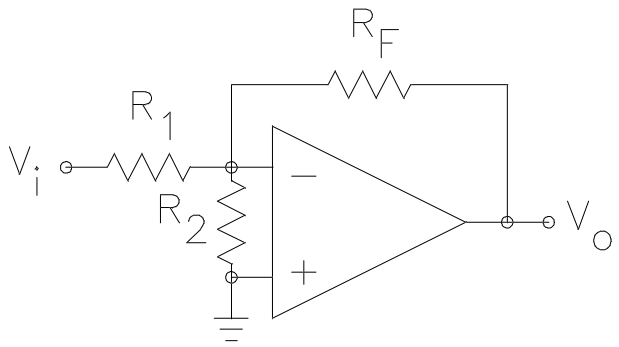

Figure P3.

(a) Use superposition of V_i and V_o to write the equation for V_-. Use this equation and the above equation for V_o to solve for the transfer function for V_o/V_i.

(b) Sketch the Bode magnitude plot for V_o/V_i. Label the asymptotic gain and the break frequency in rad/s and in Hz.

(c) What is the gain-bandwidth product of the amplifier?