ECE 3050 Analog Electronics Quiz 13

November 18, 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) What is the expression for the voltage gain V_o/V_i at very low frequencies? $V_o/V_i = -(R_2+R_3)/R_1$

(b) What is the expression for the voltage gain V_o/V_i at very high frequencies? $V_o/V_i = -R_3/R_1$

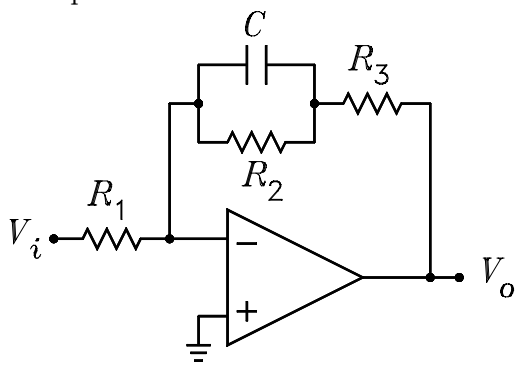
(c) Solve for the transfer function $T(s) = V_o/V_i$. Use the two-terminal impedance theorem to write

$$T(s) = -\frac{R_2+R_3}{R_1}\frac{1+R_2\|R_3Cs}{1+R_2Cs}$$

(d) What is the expression for the pole frequency of $T(s)$ in rad/s? $(R_2C)^{-1}$

(e) What is the expression for the zero frequency of $T(s)$ in rad/s? $[(R_2\|R_3)C]^{-1}$

(f) Sketch and label the straight line Bode magnitude plot for $|T(j\omega)|$. Low pass shelving Bode plot.



2 of 2. (a) What is the expression for the voltage gain V_o/V_i at very low frequencies? $1+R_3/R_1$

(b) What is the expression for the voltage gain V_o/V_i at very high frequencies? $1+(R_2\|R_3)/R_1$

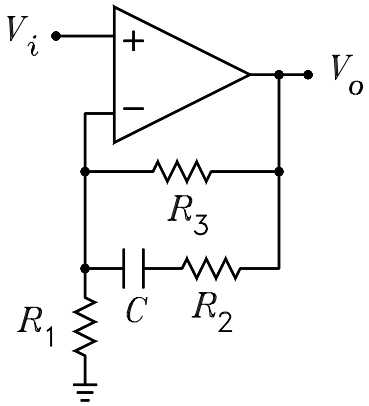
(c) Solve for the transfer function $T(s) = V_o/V_i$.

$$\frac{V_o}{V_i} = \left(1+\frac{R_3}{R_1}\right)\frac{1+(R_2+R_1\|R_3)Cs}{1+(R_2+R_3)Cs}$$

(d) What is the expression for the pole frequency of $T(s)$ in rad/s? $^{(R_2+R_3)C}-1$

(e) What is the expression for the zero frequency of $T(s)$ in rad/s? $[(R_2+R_1\|R_3)C]^{-1}$

(f) Sketch and label the straight line Bode magnitude plot for $|T(j\omega)|$. Low-pass shelving Bode plot.


V_i
+
−
V_o
R_3
C
R_2
R_1