

ECE 3050 Analog Electronics Quiz 6

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Professor Leach

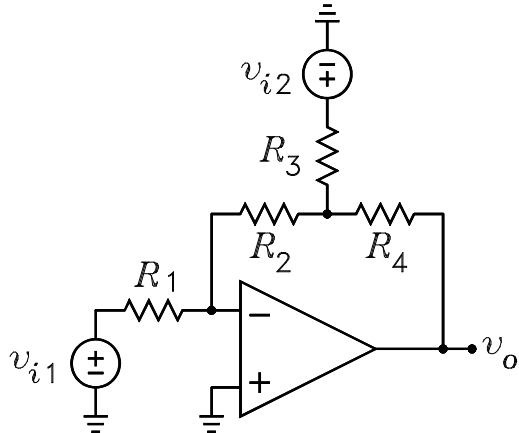
Name _____

Instructions. Print your name in the space above. **Honor Code:** *I have neither given nor received help on this quiz.* Initials _____

1. Given $R_1 = 10\text{ k}\Omega$, $R_2 = 20\text{ k}\Omega$, $R_3 = 40\text{ k}\Omega$, and $R_4 = 80\text{ k}\Omega$.

(a) With $v_{i2} = 0$, solve for $A_{v1} = v_o/v_{i1}$.

(b) With $v_{i1} = 0$, solve for $A_{v2} = v_o/v_{i2}$.



$$\frac{v_{i1}}{R_1} + \frac{v_o}{R_4 + R_2 \parallel R_3} \frac{R_3}{R_2 + R_3} = 0 \implies \frac{v_o}{v_{i1}} = -\frac{(R_4 + R_2 \parallel R_3)(1 + R_2/R_3)}{R_1} = -14$$

$$\frac{v_o}{v_{o1}} = -\frac{R_4}{R_3} = -2$$

2. Shown is a JFET current source. Given $I_D = \beta (V_{GS} - V_{TO})^2$, $\beta = 16\text{ mS}$, and $V_{TO} = -2\text{ V}$.

(a) Solve for V_{GS} for $I_D = 1\text{ mA}$.

$$V_{GS} = \sqrt{\frac{I_D}{\beta}} + V_{TO} = -1.75\text{ V}$$

(b) What is the required value of R_S for $I_D = 1\text{ mA}$?

$$R_S = \frac{-V_{GS}}{I_D} = 1.75\text{ k}\Omega$$

