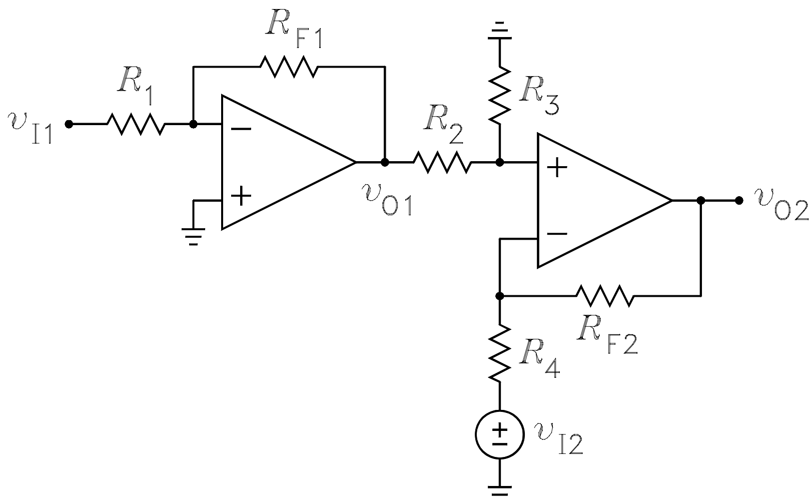
ECE 3050 Analog Electronics Quiz 10

March 25, 2009

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. The figure shows an op amp circuit. It is given that $R_1 = 20\,\mathrm{k}\Omega$, $R_2 = 4\,\mathrm{k}\Omega$, $R_3 = 6\,\mathrm{k}\Omega$, $R_4 = 3\,\mathrm{k}\Omega$, $R_{F1} = 180\,\mathrm{k}\Omega$, $R_{F2} = 30\,\mathrm{k}\Omega$.
   (a) Solve for v_{O1} as a function of v_{I1}.
   (b) Solve for v_{O2} as a function of v_{I1} and v_{I2}.

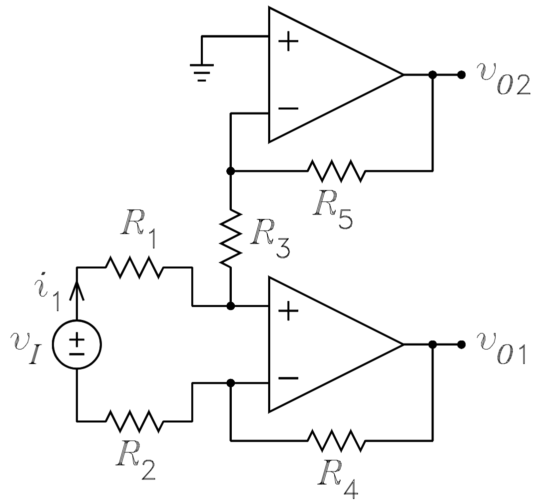


$R_1 := 20000$ $\quad R_2 := 4000$ $\quad R_3 := 6000$ $\quad R_4 := 3000$ $\quad R_{F1} := 180000$ $\quad R_{F2} := 30000$

$A_{11} := \frac{-R_{F1}}{R_1}$ $\quad A_{11} = -9$ $\quad A_{12} := A_{11} \cdot \frac{R_3}{R_2 + R_3} \cdot \left(1 + \frac{R_{F2}}{R_4}\right)$ $\quad A_{12} = -59.4$

$A_{22} := \frac{-R_{F2}}{R_4}$ $\quad A_{22} = -10$ $\quad v_{O1} = A_{11} \cdot v_{I1}$ $\quad v_{O2} = A_{12} \cdot v_{I1} + A_{22} \cdot v_{I2}$

2. The figure shows an op amp circuit. It is given that $R_1 = R_2 = 10\,\mathrm{k}\Omega$, $R_3 = R_4 = 40\,\mathrm{k}\Omega$ and $v_I = 2\,\mathrm{V}$.
   (a) Solve for i_1.
   (b) Solve for v_{O1}.
   (c) Solve for R_5 such that $v_{O2} = -v_{O1}$.



$R_1 := 10000$ $R_2 := 10000$ $R_3 := 40000$ $R_4 := 40000$ $v_I := 2$

$i_1 := \frac{v_I}{R_1 + R_2}$ $i_1 = 1 \cdot 10^{-4}$ $v_{O1} := i_1 \cdot (R_3 + R_4)$ $v_{O1} = 8$

$v_{O2} := -v_{O1}$ $R_5 := \frac{-v_{O2}}{i_1}$ $R_5 = 8 \cdot 10^4$