9.1

$$\left.\begin{array}{l} A_v = -\dfrac{200}{20} = -10 \\ \text{and} \\ R_i = 20\ \text{k}\Omega \end{array}\right\} \text{for each case}$$

9.2

a. $A_v = -\dfrac{100}{10} = -10$

$R_i = R_1 = 10\ \text{k}\Omega$

b. $A_v = -\dfrac{100 \| 100}{10} = -5$

$R_i = R_1 = 10\ \text{k}\Omega$

c. $A_v = -\dfrac{100}{10+10} = -5$

$R_i = 10+10 = 20\ \text{k}\Omega$

9.3

$$A_v = -\frac{R_2}{R_1} = -12 \Rightarrow R_2 = 12R_1$$

$R_i = \underline{R_1 = 25\ \text{k}\Omega}$

$\Rightarrow \underline{R_2 = (12)(25) = 300\ \text{k}\Omega}$

9.4

$$A_v = -\frac{R_2}{R_1} = -8 \Rightarrow R_2 = 8R_1$$

For $v_I = -1$, $i_1 = \dfrac{1}{R_1} = 15\ \mu\text{A} \Rightarrow \underline{R_1 = 66.7\ \text{k}\Omega}$

$\Rightarrow \underline{R_2 = 533.3\ \text{k}\Omega}$

9.29

$$v_o = \left(1 + \frac{50}{50}\right)\left[\left(\frac{20}{20+40}\right)v_{I2} + \left(\frac{40}{20+40}\right)v_{I1}\right]$$

$$\underline{v_o = 1.33v_{I1} + 0.667v_{I2}}$$

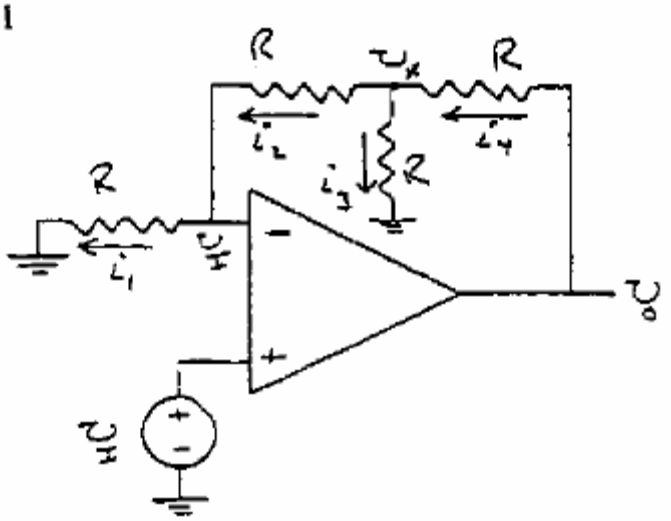
9.30

$$v_o = \left(1 + \frac{100}{50}\right) \times \left[\left(\frac{10\|40}{10\|40+20}\right)v_{I1} + \left(\frac{10\|20}{10\|20+40}\right)v_{I2}\right]$$

$$v_o = 3\left[\left(\frac{8}{8+20}\right)v_{I1} + \left(\frac{6.67}{6.67+40}\right)v_{I2}\right]$$

$$\underline{v_o = 0.857v_{I1} + 0.429v_{I2}}$$

9.31



$$i_1 = \frac{v_I}{R} = i_2$$

$$v_X = i_2 R + v_I = \left(\frac{v_I}{R}\right)R + v_I = 2v_I$$

$$i_3 = \frac{v_X}{R} = \frac{2v_I}{R}$$

$$i_4 = i_2 + i_3 = \frac{v_I}{R} + \frac{2v_I}{R} = \frac{3v_I}{R}$$

$$v_o = i_4 R + v_X = \left(\frac{3v_I}{R}\right)R + 2v_I$$

$$\underline{\frac{v_o}{v_I} = 5}$$

9.34

$$v_{oA} = \left(1 + \frac{R_2}{R_1}\right) v_I$$

$$\underline{v_{o1} = \left(1 + \frac{R_2}{R_1}\right) v_I}, \quad \underline{v_{o2} = -\left(1 + \frac{R_2}{R_1}\right) v_I}$$

So $\underline{v_{o1} = -v_{o2}}$

9.36

(a) $v_x = \left(\frac{20}{20+40}\right) \cdot v_i = \left(\frac{20}{60}\right)(6) = 2$

$\underline{v_o = 2\,V}$

(b) Same as (a)

(c) $v_x = \left(\frac{6}{6+48}\right)(6) = 0.666\,V$

$v_o = \left(1 + \frac{10}{10}\right) \cdot v_x \Rightarrow \underline{v_o = 1.33\,V}$