

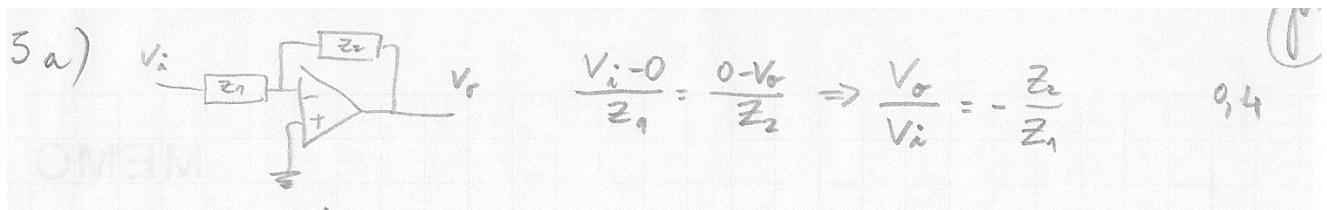
V exercício 1

$$\begin{cases} V_i - V_A = \frac{1}{C_1} \int_0^t (i_1 + i_2) dt \\ V_A - V_B = \frac{1}{C_2} \int_0^t i_2 dt \\ V_A - 0 = R_1 i_1 \\ V_B - 0 = R_2 i_2 \end{cases}$$

$$\frac{V_o}{V_i} = \frac{R_1 R_2 C_1 C_2 s^2}{R_1 R_2 C_1 C_2 s^2 + (R_1 C_2 + R_1 C_1 + R_2 C_2) s + 1}$$

$$\frac{V_o}{V_i} = \frac{s^2 R_3 C L_2 + s(L_2 + R_2 R_3 C) + R_2}{s^3 C L_1 L_2 + s^2 (R_2 L_1 + R_3 L_1 + R_3 L_2 + R_1 L_2) C + s(L_1 + L_2 + R_1 R_2 C + R_1 R_3 C + R_2 R_3 C) + (R_1 + R_2)}$$

2 g)



$$\frac{V_o}{V_i} = -\frac{\frac{1}{C_2 s}}{R_1} = -\frac{1}{R_1 C_2 s}$$

$$f) \frac{V_o}{V_i} = -\frac{R_2}{\frac{1}{C_1 s}} = -R_2 C_1 s$$

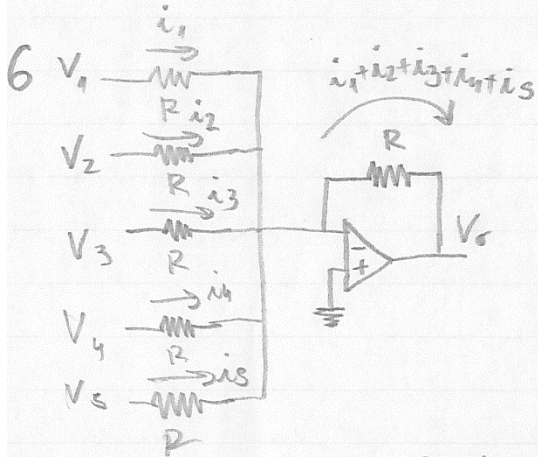
$$c) \frac{V_o}{V_i} = -\frac{L_2 s}{R_1}$$

$$g) \frac{V_o}{V_i} = -\frac{R_2}{R_1 + \frac{1}{C_1 s}} = -\frac{R_2 C_1 s}{1 + R_1 C_1 s}$$

$$j) \frac{V_o}{V_i} = -\frac{\frac{1}{R_2 + C_2 s}}{R_1} = -\frac{R_2}{R_1 + R_1 R_2 C_2 s}$$

$$m) \frac{V_o}{V_i} = -\frac{\frac{1}{R_2 + L_2 s}}{R_1 + L_1 s} = -\frac{\frac{L_2 s + R_2}{R_2 L_2 s}}{R_1 + L_1 s} = \frac{R_2 L_2 s}{(L_2 s + R_2)(L_1 s + R_1)} = -\frac{R_2 L_2 s}{L_1 L_2 s^2 + (R_1 L_2 + R_2 L_1) s + R_1 R_2}$$

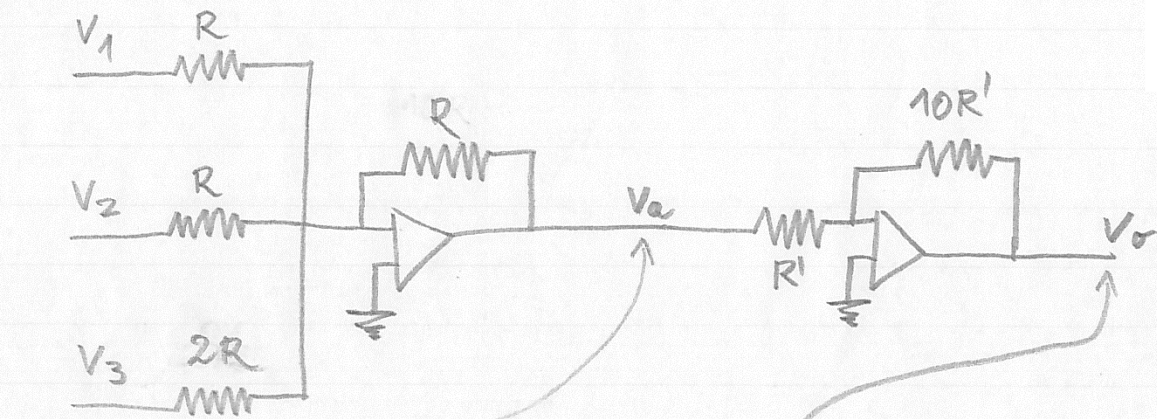
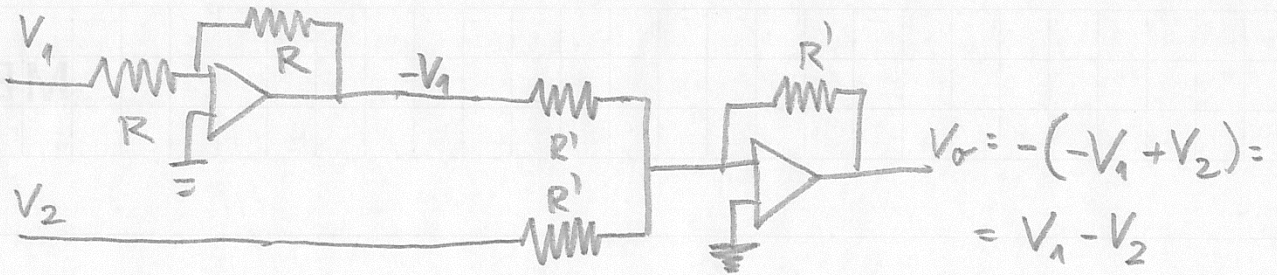
$$\begin{aligned}
 n) \quad \frac{V_o}{V_i} &= - \frac{R_2 + L_2 \Delta}{\frac{1}{\frac{1}{R_1} + \frac{1}{L_1 \Delta}}} = - \frac{R_2 + L_2 \Delta}{\frac{L_1 \Delta + R_1}{R_1 L_1 \Delta}} = - \frac{(L_2 \Delta + R_2)(L_1 \Delta + R_1)}{R_1 L_1 \Delta} \\
 &= - \frac{L_1 L_2 \Delta^2 + (R_1 L_2 + R_2 L_1) \Delta + R_1 R_2}{R_1 L_1 \Delta}
 \end{aligned}$$



$$\frac{0 - V_o}{R} = \frac{V_1 - 0}{R} + \frac{V_2 - 0}{R} + \frac{V_3 - 0}{R} + \frac{V_4 - 0}{R} + \frac{V_5 - 0}{R}$$

$$V_o = -(V_1 + V_2 + V_3 + V_4 + V_5)$$

Exercícios 7 e 9



$$\frac{0 - V_a}{R} = \frac{V_1 - 0}{R} + \frac{V_2 - 0}{R} + \frac{V_3 - 0}{2R}$$

$$V_a = - \left(V_1 + V_2 + \frac{V_3}{2} \right)$$

$$\frac{0 - V_o}{10R'} = \frac{V_a - 0}{R'}$$

$$\begin{aligned}
 V_o &= -10V_a \\
 &= 10 \left(V_1 + V_2 + \frac{V_3}{2} \right)
 \end{aligned}$$