

ECE 420 — Latex Homework Examples

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Due Date: August 32, 2020, 9:00 AM
Assignment: 3

Problem 1: Solve for V_{out} in the circuit below:

$$V_{p1} = \left(\frac{R_1}{R_1 + R_2} \right) V_1$$

$$\frac{V_{p1} - 0}{R_3} + \frac{V_{p1} - V_{out1}}{R_4} = 0$$

$$\frac{1}{R_3} V_{p1} + \frac{1}{R_4} V_{p1} - \frac{1}{R_4} V_{out1} = 0$$

$$\frac{1}{R_4} V_{out1} = \frac{1}{R_3} V_{p1} + \frac{1}{R_4} V_{out1}$$

$$V_{out1} = \left(\frac{R_4}{R_3} + 1 \right) V_{p1}$$

$$\frac{V_{out1}}{V_{in}} = \left(\frac{R_4}{R_3} + 1 \right) \left(\frac{R_1}{R_1 + R_2} \right)$$

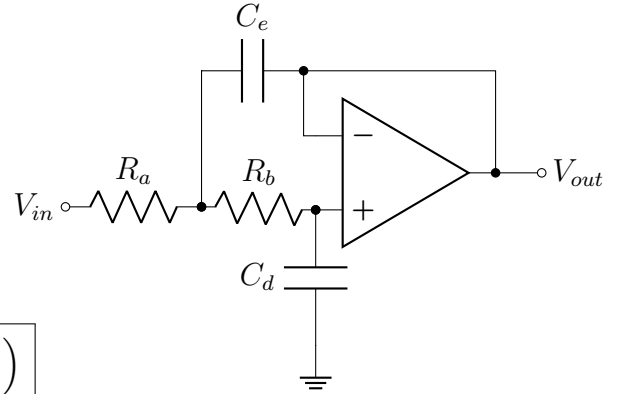
$$\frac{0 - V_{out1}}{R_5} + \frac{0 - V_{out2}}{R_6} = 0$$

$$-\frac{V_{out1}}{R_5} - \frac{V_{out2}}{R_6} = 0$$

$$-\frac{V_{out1}}{R_5} = \frac{V_{out2}}{R_6}$$

$$V_{out2} = - \left(\frac{R_6}{R_5} \right) V_{out1}$$

$$\boxed{\frac{V_{out}}{V_{in}} = \left(\frac{-R_6}{R_5} \right) \left(\frac{R_4}{R_3} + 1 \right) \left(\frac{R_1}{R_1 + R_2} \right)}$$



Problem 2: Solve for V_{out} in the circuit below:

$$V_{p1} = \left(\frac{R_1}{R_1 + R_2} \right) V_1$$

$$\frac{V_{p1} - 0}{R_3} + \frac{V_{p1} - V_{out1}}{R_4} = 0$$

$$\frac{1}{R_3} V_{p1} + \frac{1}{R_4} V_{p1} - \frac{1}{R_4} V_{out1} = 0$$

$$\frac{1}{R_4} V_{out1} = \frac{1}{R_3} V_{p1} + \frac{1}{R_4} V_{out1}$$

$$V_{out1} = \left(\frac{R_4}{R_3} + 1 \right) V_{p1}$$

$$\frac{V_{out1}}{V_{in}} = \left(\frac{R_4}{R_3} + 1 \right) \left(\frac{R_1}{R_1 + R_2} \right)$$

$$\frac{0 - V_{out1}}{R_5} + \frac{0 - V_{out2}}{R_6} = 0$$

$$-\frac{V_{out1}}{R_5} - \frac{V_{out2}}{R_6} = 0$$

$$-\frac{V_{out1}}{R_5} = \frac{V_{out2}}{R_6}$$

$$V_{out2} = - \left(\frac{R_6}{R_5} \right) V_{out1}$$

$$\boxed{\frac{V_{out}}{V_{in}} = \left(\frac{-R_6}{R_5} \right) \left(\frac{R_4}{R_3} + 1 \right) \left(\frac{R_1}{R_1 + R_2} \right)}$$

$$L_1 = 50\mu\text{H}, R_1 = 500\mu\Omega, C_1 = 700\mu\text{C}$$

