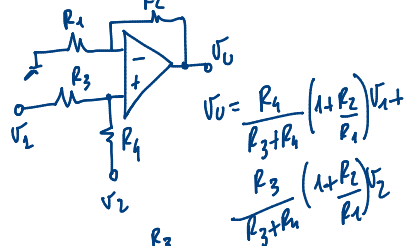
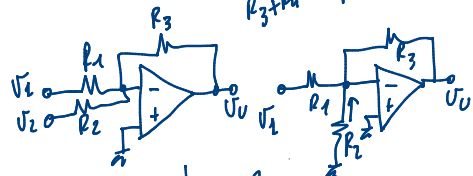


$$V_U = -\frac{R_2}{R_1} (V_1 - V_2)$$

$$\underbrace{\frac{R_2}{R_1}}_{Ad} \quad V_U = Ad (V_1 - V_2)$$



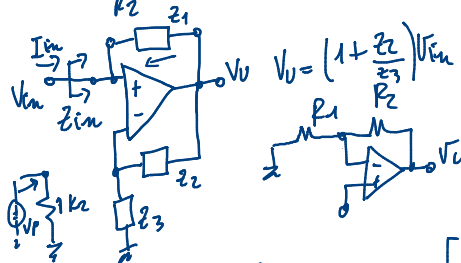
$$V_U = \frac{R_4}{R_3 + R_4} \left(1 + \frac{R_2}{R_1}\right) V_1 + \frac{R_3}{R_3 + R_4} \left(1 + \frac{R_2}{R_1}\right) V_2$$



$$V_U \Big|_{V_2=0} = -\frac{R_3}{R_1} V_1$$

$$V_U = -\frac{R_3}{R_1} V_1 + \frac{R_3}{R_2} V_2$$

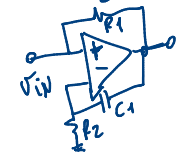
$$V_U \Big|_{V_1=0} = -\frac{R_3}{R_2} V_2$$

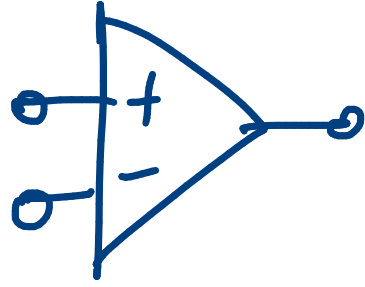
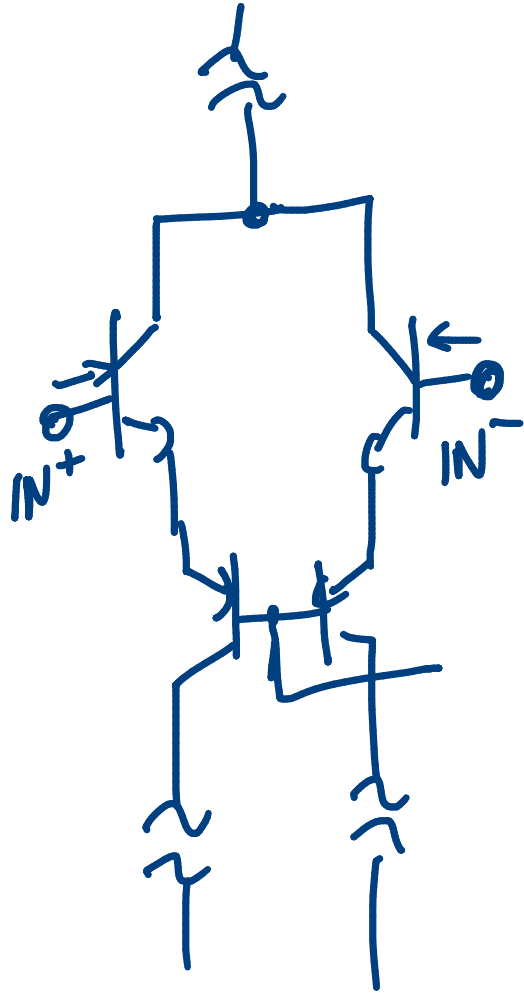


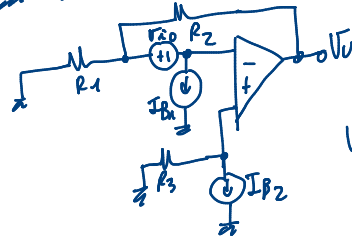
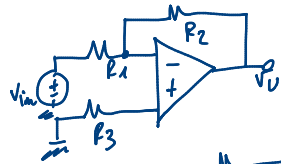
$$V_U = \left(1 + \frac{z_2}{z_3}\right) V_{in}$$

$$I_{in} = \frac{V_{in} - V_U}{z_1} \Rightarrow z_1 I_{in} = \left[1 - \left(1 + \frac{z_2}{z_3}\right) V_{in}\right] V_{in}$$

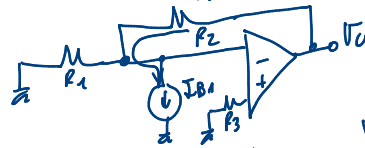
$$\frac{V_{in}}{I_{in}} = -\frac{z_1 z_3}{z_2} = Z_{in} \Rightarrow z_1 I_{in} = -\frac{z_2}{z_3} V_{in}$$



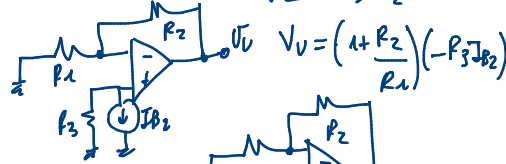




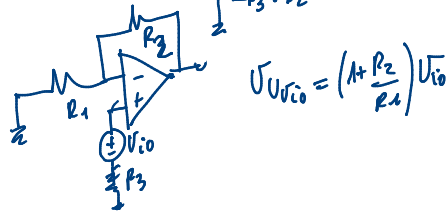
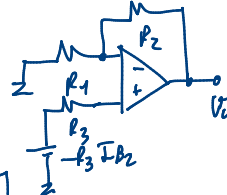
$$U_{I_{B1}} = R_2 I_{B1}$$



$$V^+ = -R_3 I_{B2}$$



$$v_U = \left(1 + \frac{R_2}{R_1}\right) (-R_3 I_{B2})$$



$$v_U v_{io} = \left(1 + \frac{R_2}{R_1}\right) v_{io}$$

$$v_U = R_2 I_{B1} - \left(1 + \frac{R_2}{R_1}\right) R_3 I_{B2} + \left(1 + \frac{R_2}{R_1}\right) v_{io}$$

$$I_{B1} < 70 \mu A$$

$$v_{co} = 1 mV$$

$$I_{B2} < 70 \mu A$$

$$v_U = R I_{B1} - 2 R I_{B2} + 2 v_{io}$$