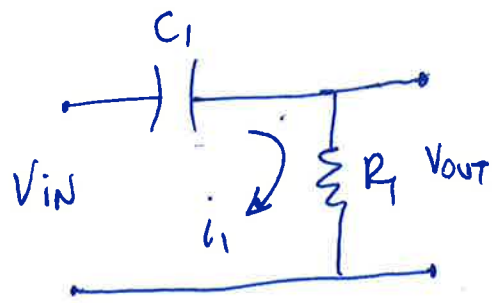
HIGH PASS



$$V_{IN} = \frac{1}{C_1}\int i_1\,dt + R_1 i_1$$

$$V_{OUT} = R_1 i_1$$

$$\mathcal{L}\downarrow$$

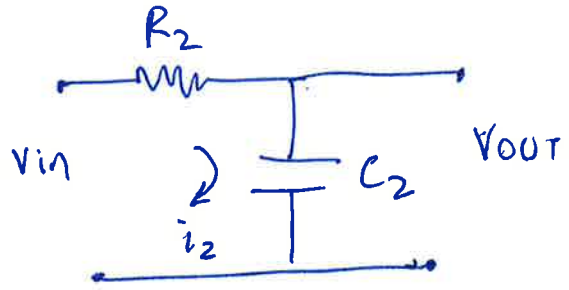
$$V_{IN} = \frac{i_1}{sC_1} + R_1 i_1$$

$$V_{OUT} = R_1 i_1$$

$$G_1 = \frac{V_{OUT}}{V_{IN}} = \frac{R_1}{\frac{1}{sC_1} + R_1}$$

$$\boxed{G_1 = \frac{sC_1R_1}{1 + sC_1R_1}}$$

LOW PASS



$$V_{IN} = R_2 i_2 + \frac{1}{C_2}\int i_2\,dt$$

$$V_{OUT} = \frac{1}{C_2}\int i_2\,dt$$

$$\mathcal{L}\downarrow$$

$$V_{IN} = R_2 i_2 + \frac{i_2}{sC_2}$$

$$V_{OUT} = \frac{i_2}{sC_2}$$

$$G_2 = \frac{V_{OUT}}{V_{IN}} = \frac{\frac{1}{sC_2}}{R_2 + \frac{1}{sC_2}}$$

$$\boxed{G_2 = \frac{1}{sC_2R_2 + 1}}$$

FILTER TF $= G_1 G_2$

$$G_1 G_2 = \frac{sC_1R_1}{(sC_1R_1 + 1)(sC_2R_2 + 1)} = \frac{sC_1R_1}{s^2C_1R_1C_2R_2 + \cdots}$$

$$\cdots (C_2R_2 + C_1R_1)s + 1$$