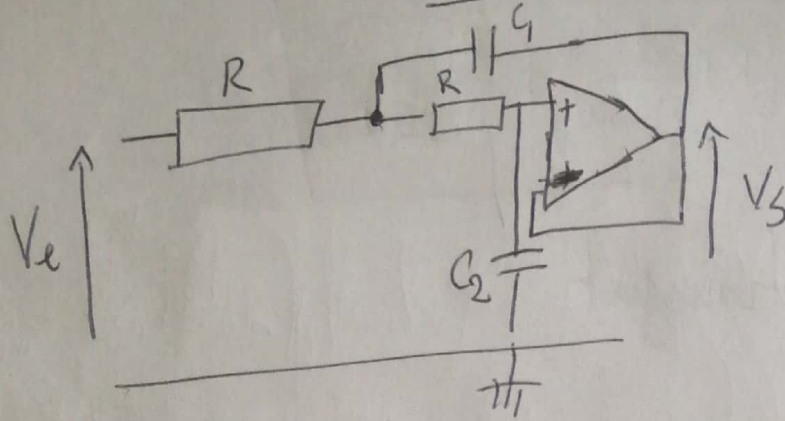


Exo 2



$$I_1 = \frac{V_e - V_A}{R} = \frac{V_A - V_s}{Z_{C1}} + \frac{V_A}{R + Z_{C2}}$$

$$\frac{V_e - V_A}{R} = \frac{V_A - V_s}{Z_{C1}} + \frac{V_A}{R + Z_{C2}}$$

$$\frac{V_e}{R} - \frac{V_A}{R} = \frac{V_A}{Z_{C1}} - \frac{V_s}{Z_{C1}} + \frac{V_A}{R + Z_{C2}}$$

$$\frac{V_A}{R} + \frac{V_A}{Z_{C1}} + \frac{V_A}{R + Z_{C2}} = \frac{V_e}{R} + \frac{V_s}{Z_{C1}}$$

$$V_A \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) = \frac{V_e}{R} + \frac{V_s}{Z_{C1}}$$

$$V_A \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) = \frac{V_e Z_{C1} + V_s R}{R Z_{C1}}$$

$$V_A \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) = \frac{V_e Z_{C1} + V_s R}{R Z_{C1}}$$

$$V_A = \frac{V_e Z_{C1} + V_s R}{R Z_{C1}}$$

$$\frac{1}{\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}}}$$

$$V_A = \frac{\left(\frac{V_e}{\partial C_{2W}} + Y_S R \right) \left(R + \frac{1}{\partial C_{2W}} \right)}{\left(R + \frac{1}{\partial C_{2W}} \right) \left(R + \frac{1}{\partial C_{2W}} \right) + \frac{R}{\partial C_{2W}}}$$

2. fonction de transfert

$$\frac{V_e - V_A}{R} =$$

2- fonction de transfert

$$\frac{V_e - V_A}{R} = \frac{V_A - V_s}{Z_{C1}} + \frac{V_A}{R + Z_{C2}}$$

$$V_s \left(1 + \frac{R}{Z_{C2}} \right) \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) - \frac{V_s}{Z_{C1}} = \frac{V_e}{R}$$

$$V_s \left[\left(1 + \frac{R}{Z_{C2}} \right) \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) - \frac{1}{Z_{C1}} \right] = \frac{V_e}{R}$$

$$\frac{V_s}{V_e} = \frac{1}{R \left(1 + \frac{R}{Z_{C2}} \right) \left(\frac{1}{R} + \frac{1}{Z_{C1}} + \frac{1}{R + Z_{C2}} \right) - \frac{R}{Z_{C1}}}$$

$$\frac{V_s}{V_e} = \frac{1}{R \left(\frac{Z_{C2} + R}{Z_{C2}} \right) \left(\frac{Z_{C2}(R + Z_{C1})}{R Z_{C2}(R + Z_{C1})} + \frac{R(R + Z_{C2})}{R Z_{C2}(R + Z_{C1})} + \frac{R Z_{C2}}{(R + Z_{C2})R} \right) - \frac{R}{Z_{C1}}}$$

$$\frac{V_s}{V_e} = \frac{1}{R \left(\frac{Z_{C2} + R}{Z_{C2}} \right) \left(\frac{Z_{C2}R + Z_{C1}^2 + R^2 + R Z_{C2} + R Z_{C2}}{R Z_{C2}(R + Z_{C1})} \right) - \frac{R}{Z_{C1}}}$$

$$\frac{V_s}{V_e} = \frac{1}{R \left(\frac{Z_{C2}R + Z_{C1}^2 + R^2 + R Z_{C2} + R Z_{C2}}{Z_{C2}^2} \right) - \frac{R}{Z_{C1}}}$$

$$\frac{V_s}{V_e} = \frac{1}{\frac{3 Z_{C2}R + Z_{C1}^2 + R^2}{Z_{C2}^2} - \frac{R}{Z_{C1}}}$$