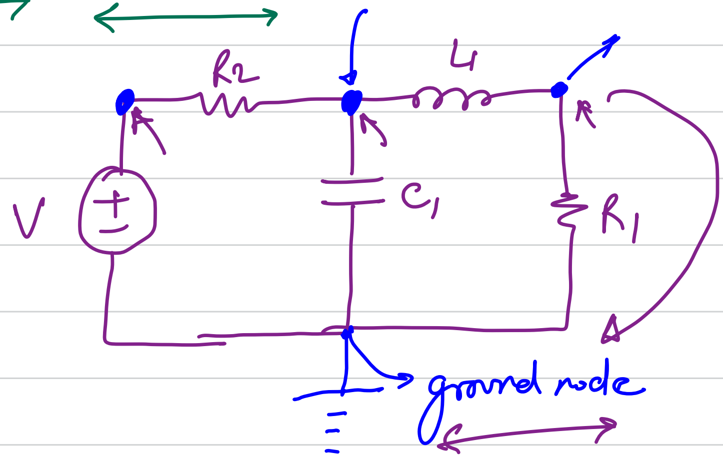
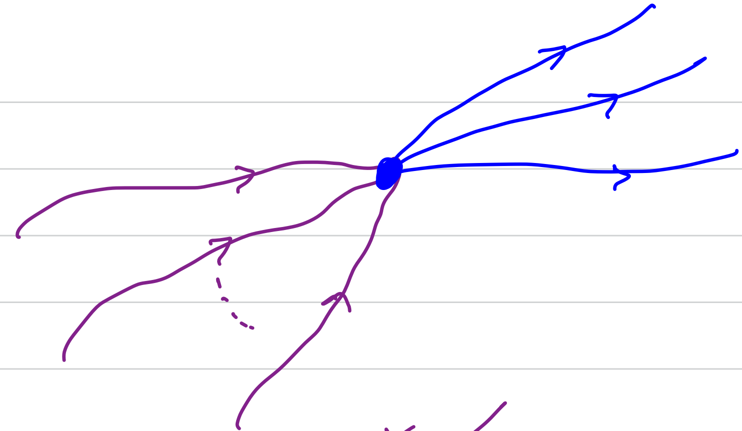
Lecture 5

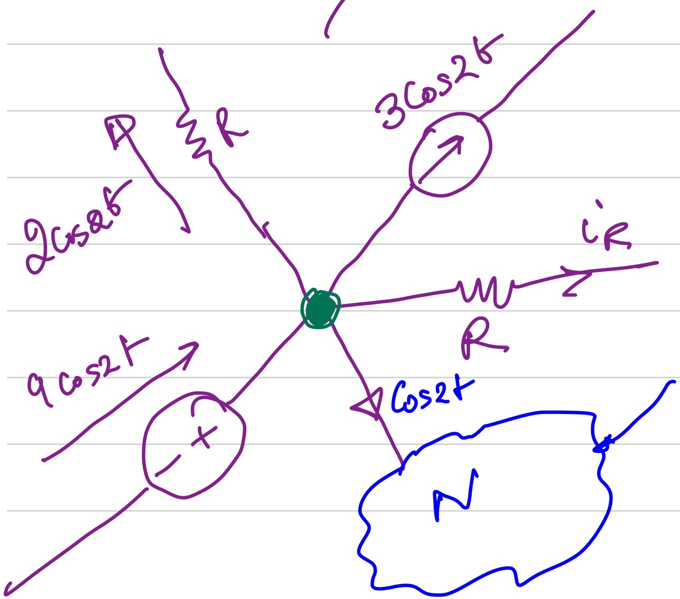
* Node, Branch



KCL (Kirchhoff's Current law).

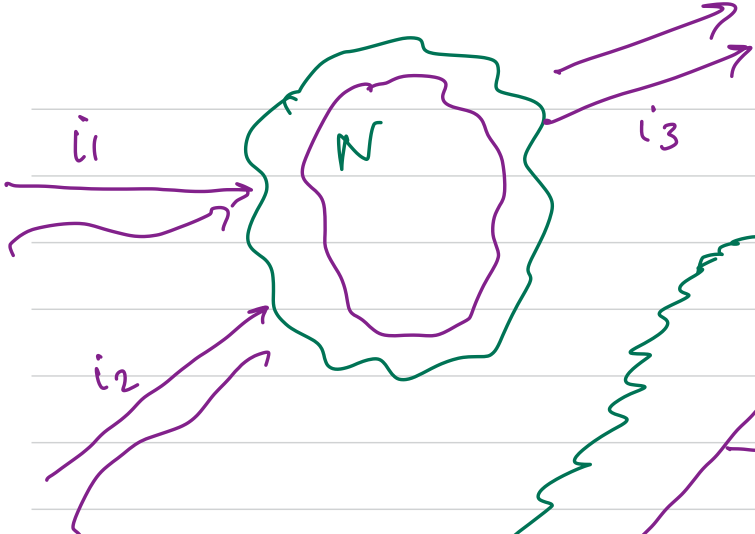
The algebric sum of currents entering a node = algebric sum of current leaving the node



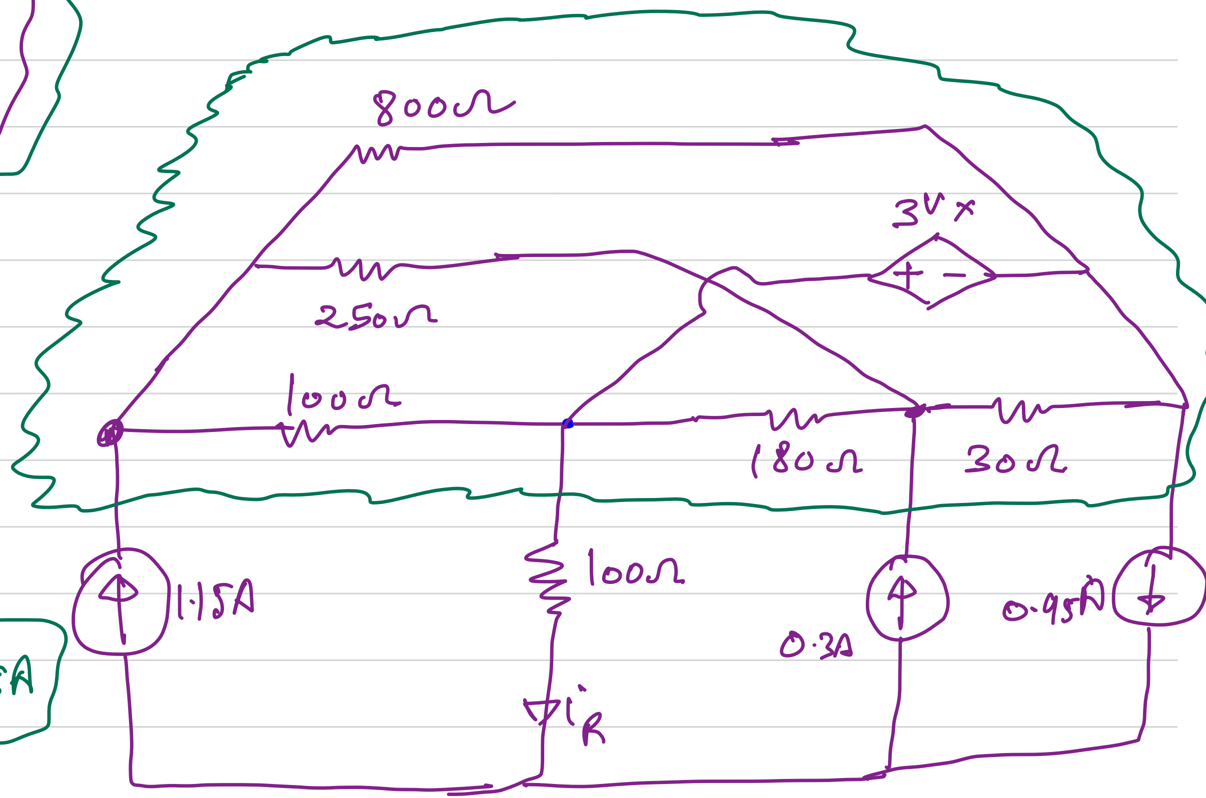


$$9\cos 2t = 2\cos 2t + 3\cos 2t + i_R$$
$$+\cos 2t$$

$$i_R = 3\cos 2t$$



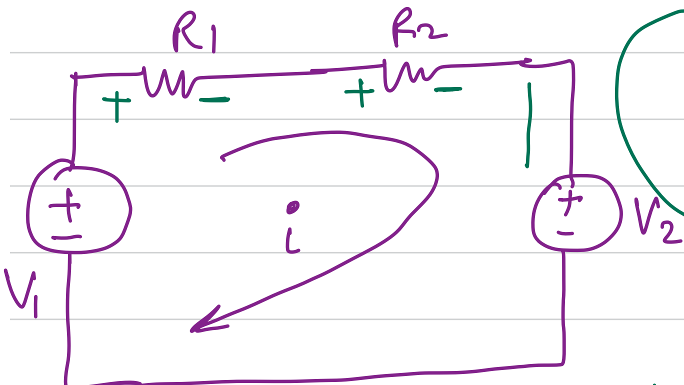
$$\boxed{i_1 + i_2 = i_3}$$



$$\boxed{1.15 + 0.3A = i_R + 0.95A}$$

"KVL"

Algebric sum of voltage drop around any closed path is zero at every instant of time

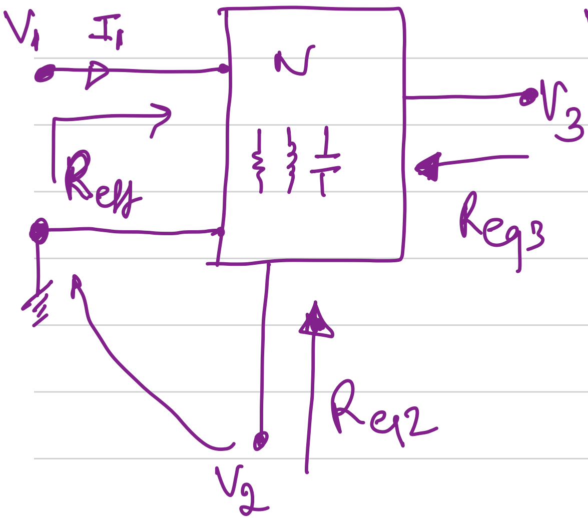


$$+V_1 - iR_1 - iR_2 - V_2 = 0$$

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

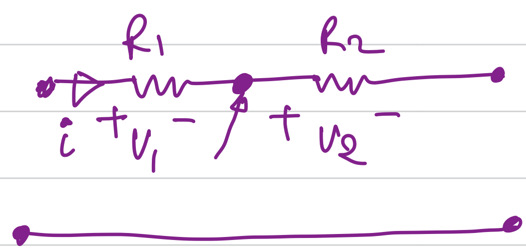
$$(-V_1 + i_1R_1 + i_1R_2 + V_2) = 0$$

Series

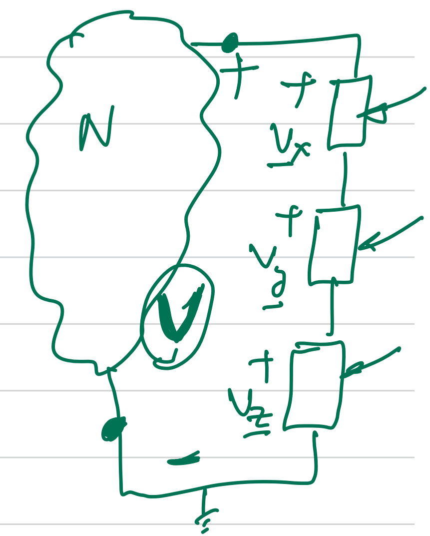


$V_1 = A\ I_1$

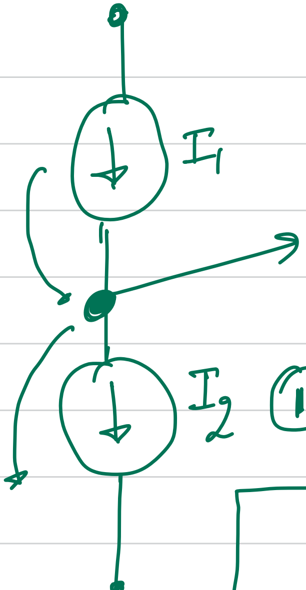
Series Connecte



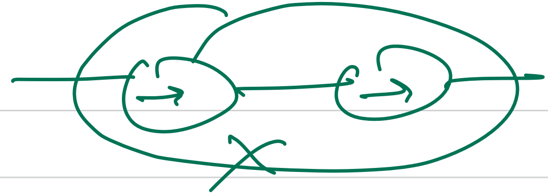
$V = V_1 + V_2$

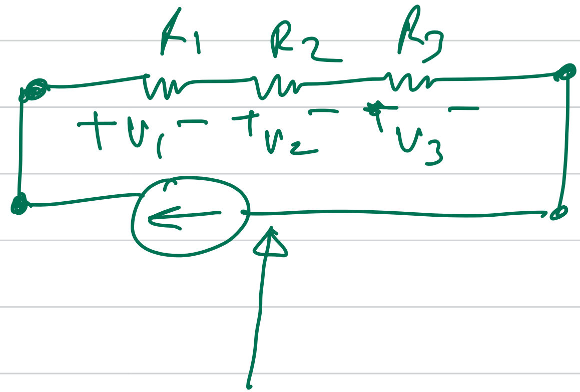


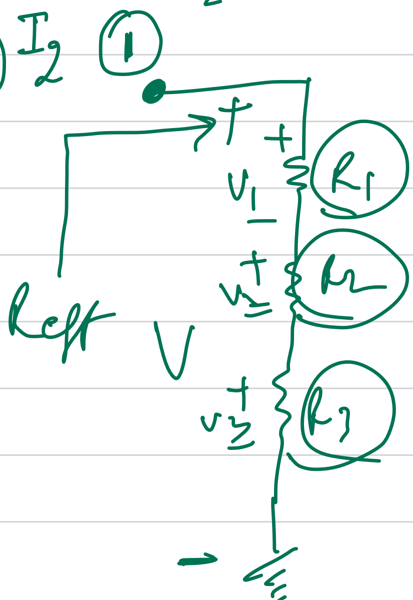
$V_x + V_y + V_z = V$



$I_1 = I_2$

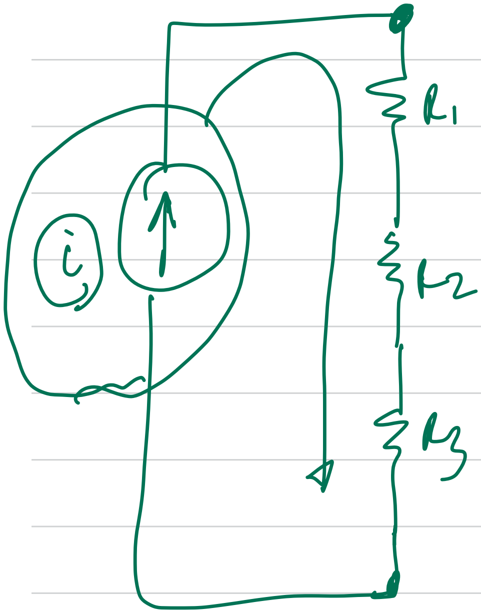


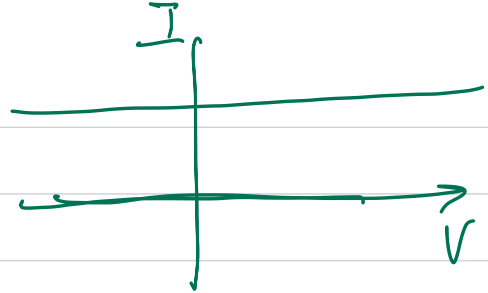




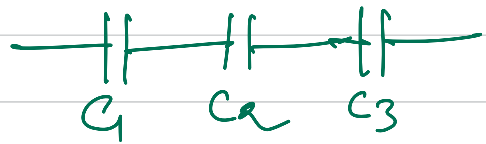
$$R_{eff} = R_1 + R_2 + R_3$$

$$I = \frac{V}{(R_1 + R_2 + R_3)}$$

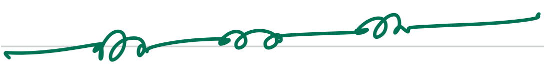




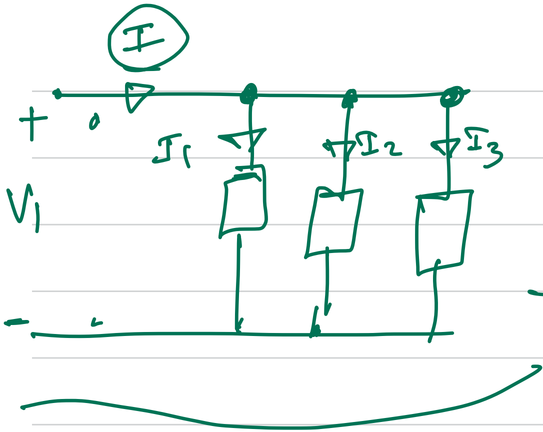
$$\boxed{V_1 = \frac{1}{C}\int i\,dt}$$

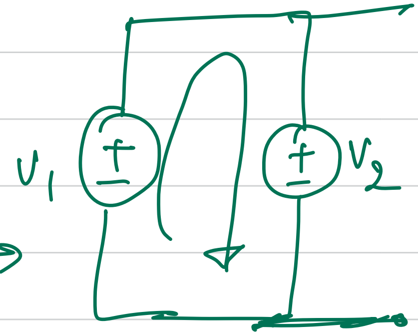


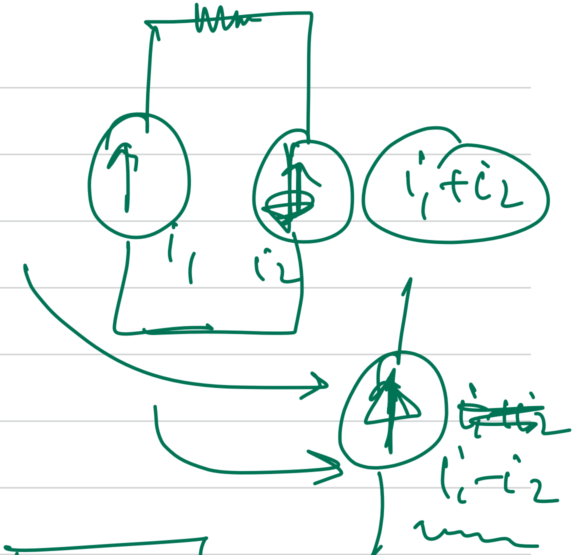
$$\frac{1}{C_{eq}} = \left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}\right)$$

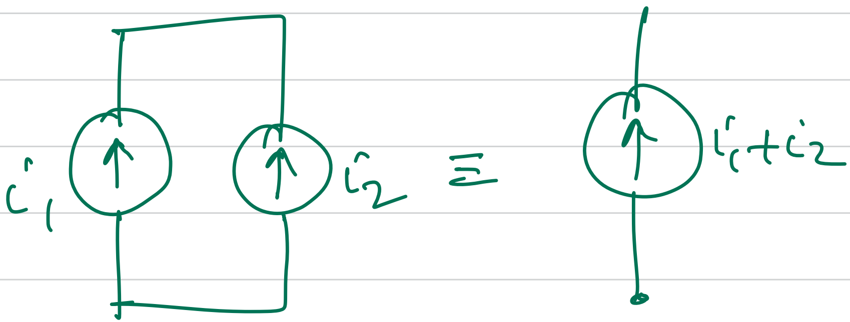


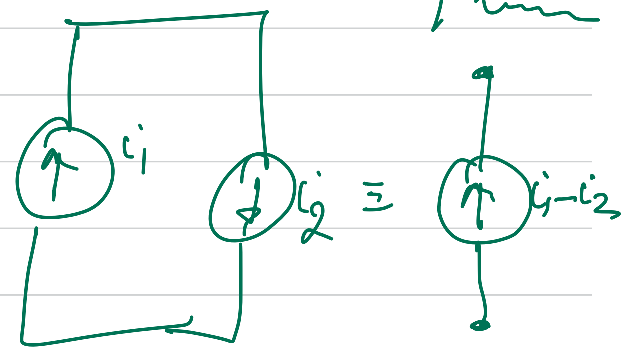
$$L_{eq} = L_1 + L_2 + L_3 \ldots$$


I
I1
I2
I3
V1

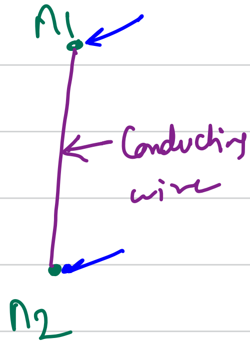

V1
V2


i1
i2
i1+i2
i1-i2

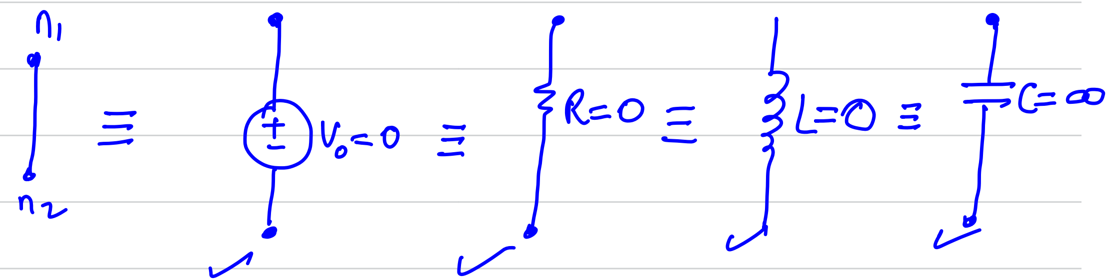

i1
i2
≡
i1+i2


i1
i2
≡
i1-i2

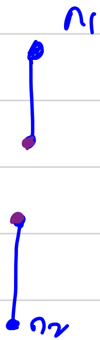
Short circuit

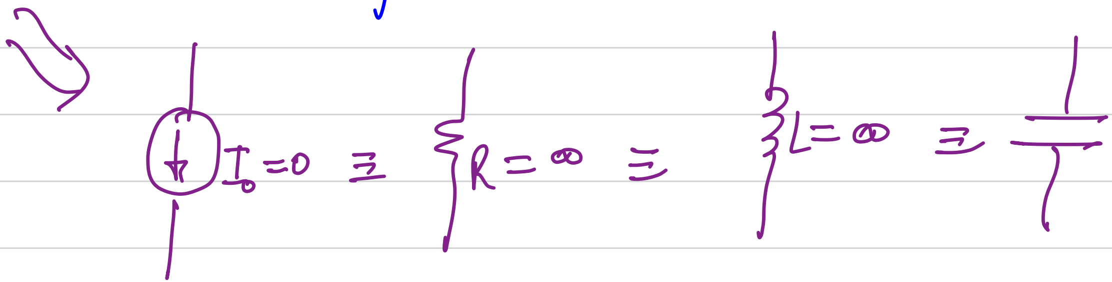


$V_{n_1} - V_{n_2} = 0$

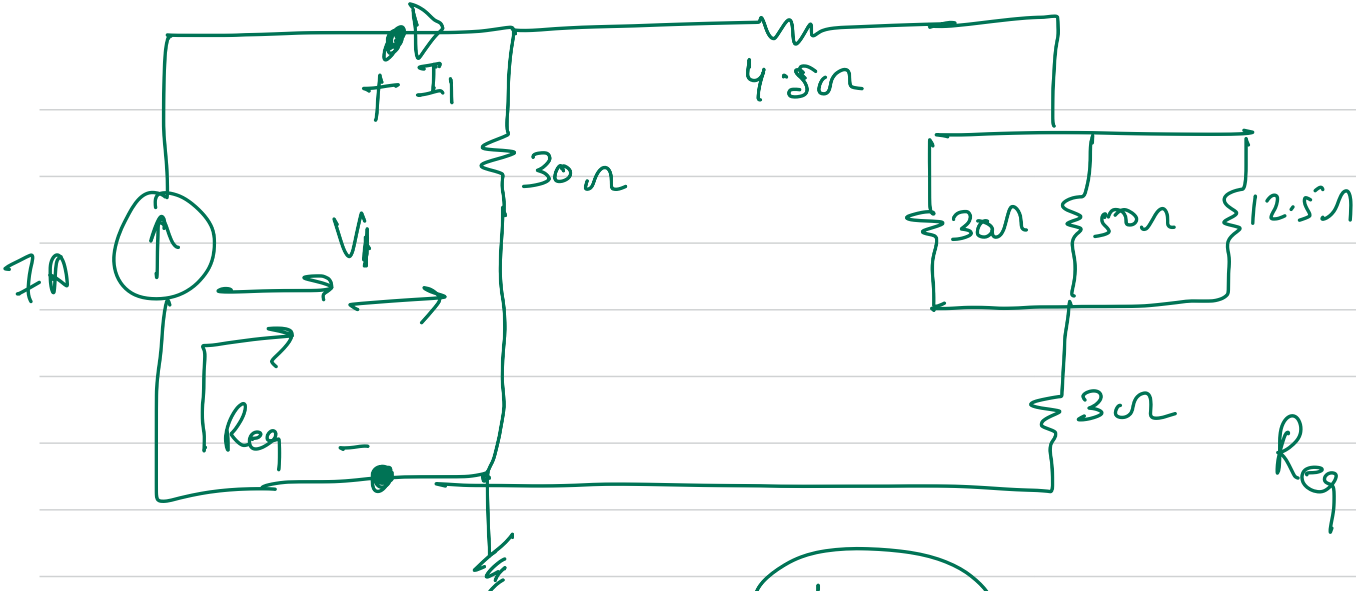


Open circuit





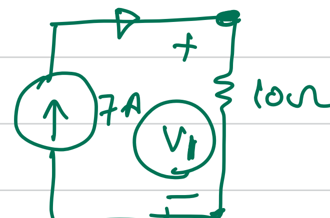
$I_0 = 0 \equiv R = \infty \equiv L = \infty \equiv C = 0$



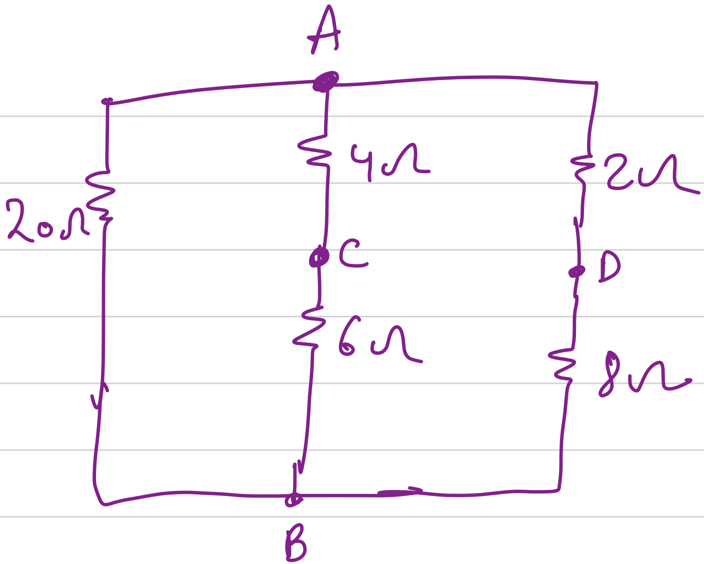
$$R_{eq} = \frac{V_1}{I_1}$$

10 Ω

$$V_1 = 70\,V$$

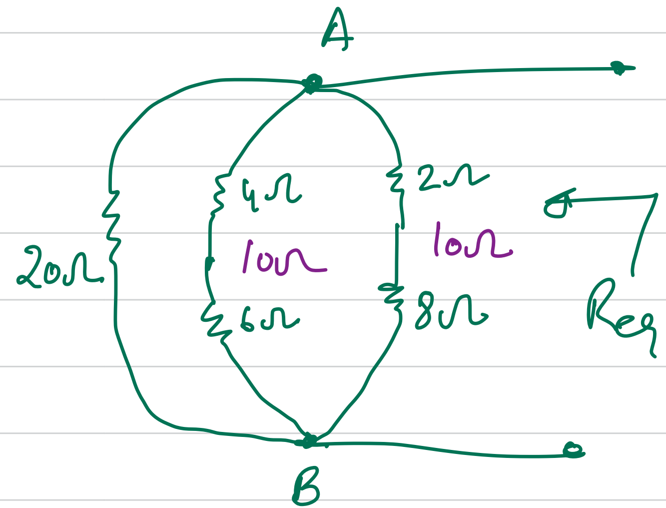


$10 \times 7 = 70V$

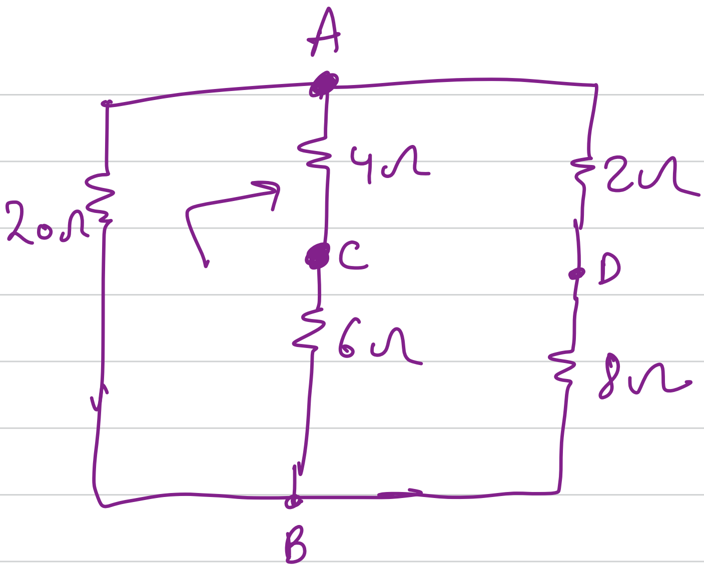


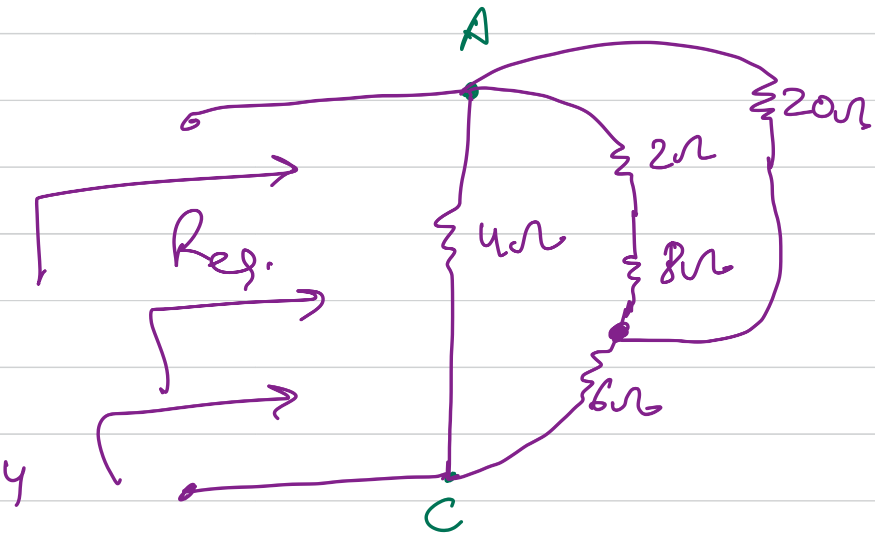
$R_{eq}(A,B)$

$R_{eq}(A,B)$ "4"



$R_{eq}(A, C)$





$R_{eq} = 3.04$

Req (C,D)