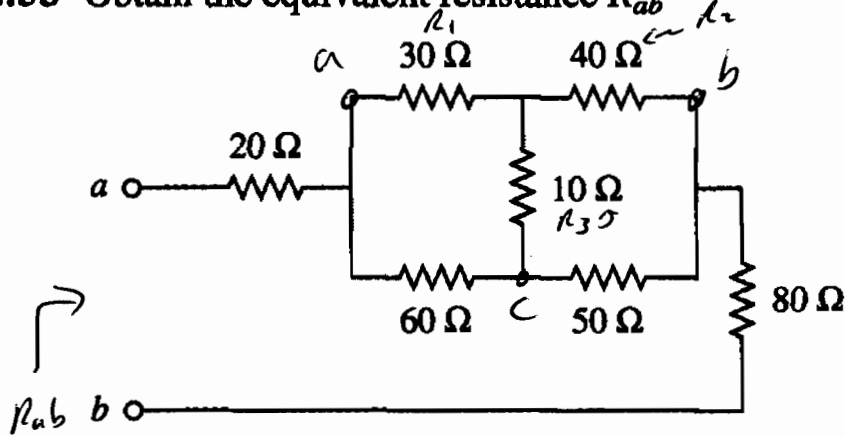


2.53 Obtain the equivalent resistance R_{ab} 

(a)

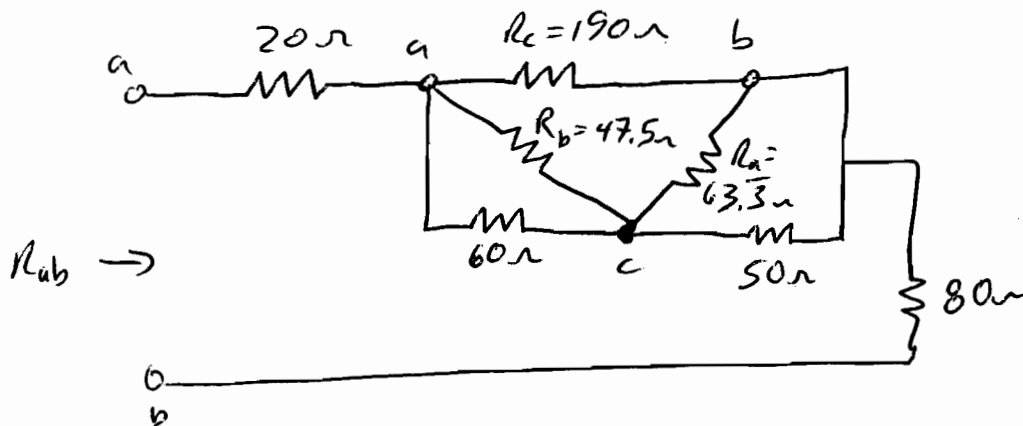
Do a $Y \rightarrow \Delta$ conversion per Fig 2.49 + (2.53 \rightarrow 2.55)

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1} = \frac{30(40) + 40(10) + 10(30)}{30} = \frac{1900}{30}$$

$$R_a = \underline{63.\bar{3} \Omega}$$

$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2} = \frac{1900}{40} = \underline{47.5 \Omega}$$

$$R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3} = \frac{1900}{10} = \underline{190 \Omega}$$



$$R_{ab} = 20 + 190 \parallel [47.5 \parallel 60 + 63.\bar{3} \parallel 50] + 80$$

$$= 20 + 190 \parallel [26.5116 + 27.9412] + 80$$

$$= 20 + 190 \parallel 54.4528 + 80 = 20 + 42.\bar{3}232 + 80$$

$$\underline{\underline{R_{ab} = 142.\bar{3}2 \Omega}}$$