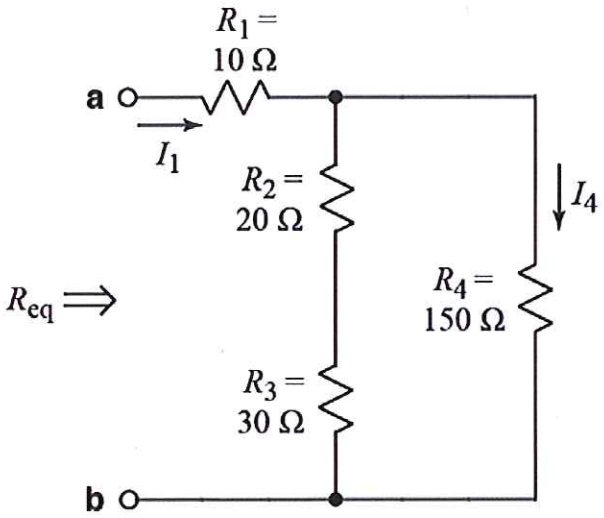
EXAM #1 prob 2 solution

Ex:

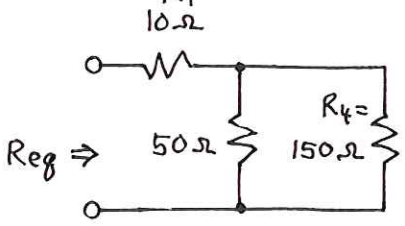


a) Find the value of the equivalent resistance, R_{eq}.

b) If a current source is connected to the above network and current I_1 = 100mA flows into terminal **a**, find I_4.

soln a) Resistors in series sum and resistors in parallel sum as conductances: $A \| B = \frac{AB}{A+B}$

$$R_2 + R_3 = 20\,\Omega + 30\,\Omega = 50\,\Omega$$

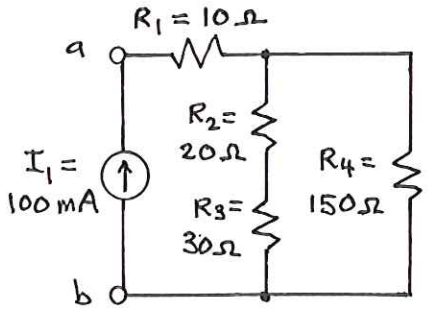


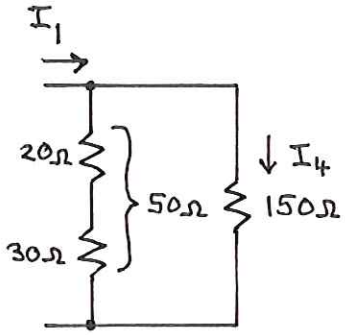
$$50\,\Omega \| R_4 = 50\,\Omega \| 150\,\Omega = 50\,\Omega \cdot 1 \| 3 = 50\,\Omega \cdot \frac{3}{4}$$

$$= \frac{150}{4}\,\Omega = 37.5\,\Omega$$

We add the 10Ω in series to get $R_{eq} = 47.5\,\Omega$

b)





We have a current-divider as shown in the upper right diagram. Note that I_1 flows thru R_1 and then splits between the $50\,\Omega$ in the center branch and the $150\,\Omega$ in the right branch, (i.e., I_4). So we use the current-divider formula.

$$I_4 = I_1 \cdot \frac{50\,\Omega}{50\,\Omega + 150\,\Omega} = I_4\left(\frac{1}{4}\right) = \frac{100\,mA}{4} = 25\,mA$$