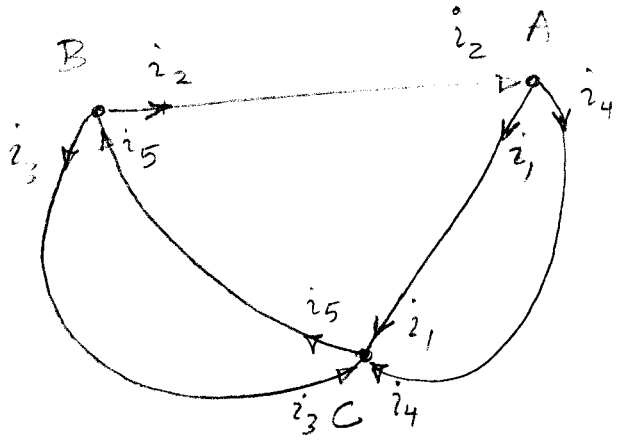
Problem 2.27



Problem 2-31

$$R_{eq} = \left(\frac{1}{R} + \cdots + \frac{1}{R}\right)^{-1} = \left(\frac{1}{50} + \cdots + \frac{1}{50}\right)^{-1} = \frac{50}{n} \Rightarrow$$

(R: n terms; 50: n terms)

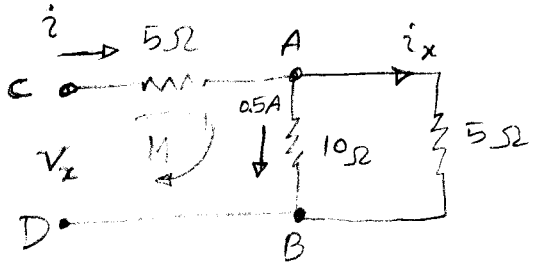
$$R_{eq} = \frac{50}{n} \ k\Omega \quad , \quad v = R_{eq} \cdot i \Rightarrow$$

but we know $\quad (1.5 + 1.5) = \frac{50}{n} \cdot i \Rightarrow$

$$3\,V = \left(\frac{50}{n}\right) k\Omega \cdot \left(500 \times 10^{-6}\right) A \longrightarrow 2 = \frac{50 \times 10^{3}}{n}\,\Omega \ 5 \times 10^{-4}\ A$$

$$n = \frac{25}{3} = 8.33 \longrightarrow \boxed{n = 8}$$

Problem 2.32



$$V_{AB} = 0.5\ A \cdot 10\ \Omega = 5\ V$$

$$V_{AB} = 5\ \Omega \cdot i_x \longrightarrow i_x = \frac{5}{5} = 1\ A \longrightarrow \boxed{i_x = 1\ A}$$

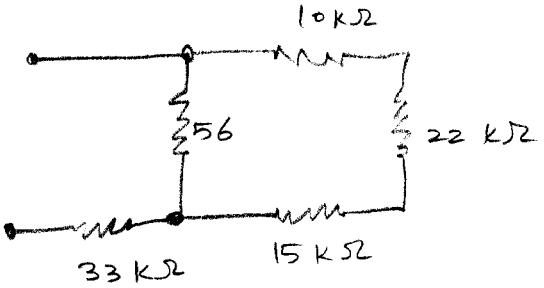
KCL at node A: $\quad i = 0.5 + i_x \longrightarrow$

$$\boxed{i = 1.5\ \Omega} \longrightarrow V_{CA} = 5 \cdot i = 7.5\ V$$

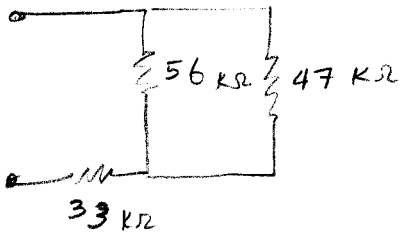
KVL for loop M: $\quad V_x = V_{CA} + V_{BA} = 7.5 + 5 = 12.5\ V$

Problem 2.42

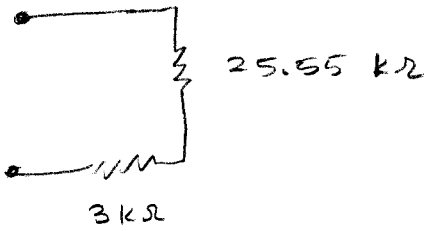
Req_1



$\Rightarrow$

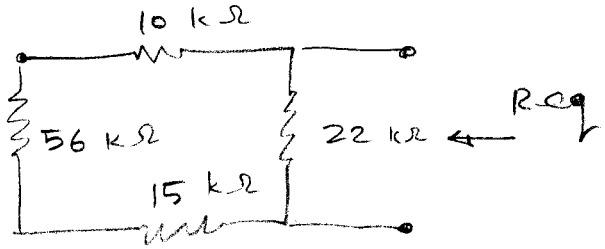


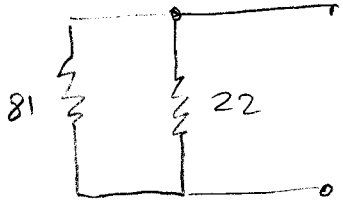
$\Rightarrow$



$\rightarrow Req = 28.55\ k\Omega$

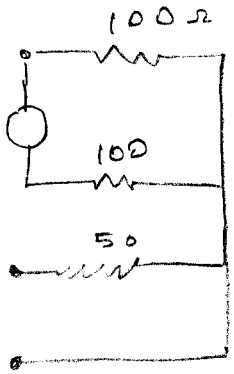
Req_2:



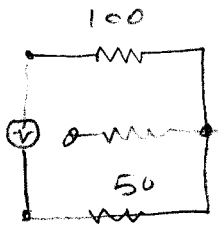


$$Req = \left(\frac{1}{81} + \frac{1}{22}\right)^{-1} = 17.3\ k\Omega$$

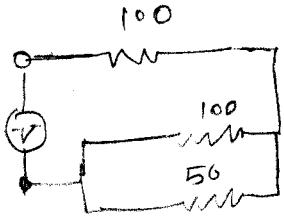
Problem 2-45



→ $R_{eq} = 200\ \Omega$

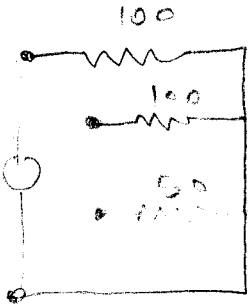


$R_{eq} = 100 + 50 = 150$

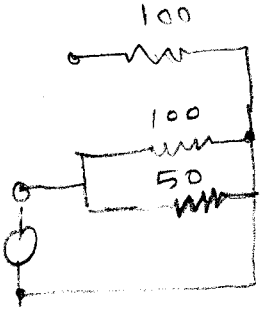


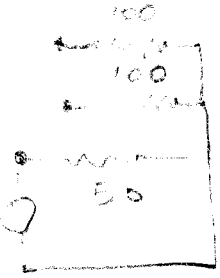
$R_{eq} = \left(\frac{1}{100} + \frac{1}{50}\right)^{-1} + 100$

$R_{eq} = 133\ \Omega$



$R_{eq} = 100\ \Omega$

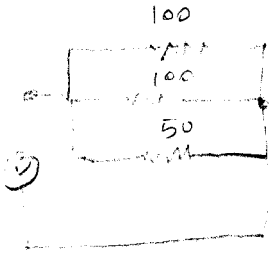




$R_{eq} = 50$

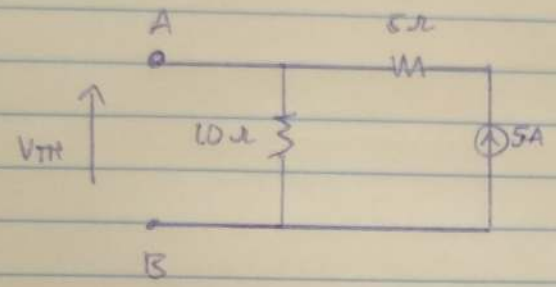
$R_{eq} = \left(\frac{1}{50} + \frac{1}{100}\right)^{-1}$

$= 33.3\ \Omega$



$R_{eq} = \left(\frac{1}{100} + \frac{1}{100} + \frac{1}{50}\right)^{-1} = 25$

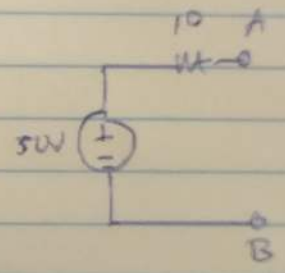
2.51

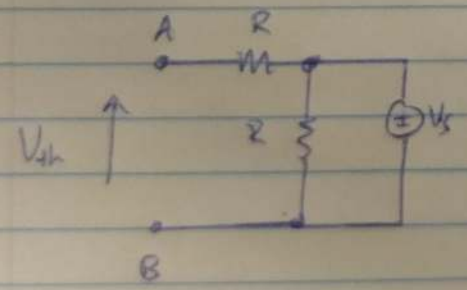


$R_{eq} = 10\Omega$

$V_{TH} = 50V$

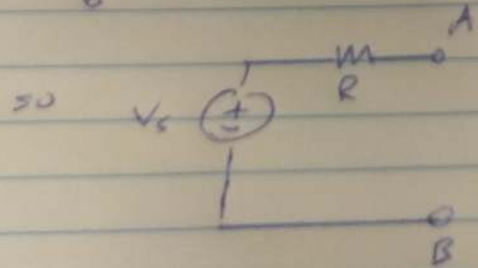
, so we get





$R_{eq} = R$

$V_{th} = V_s$



Problem 2.58

Voltage division for V_x:

$$\frac{V_x}{R_x} = \frac{V_{total}}{R_{eq}} \longrightarrow V_x = R_x \cdot \frac{V_T}{R_{eq}} = 2 \cdot \frac{24}{14}$$

$$\boxed{V_x = 3.42\ V}$$

$$V_y = R_y \cdot \frac{V_T}{R_{eq}} = 8 \cdot \frac{24}{14} = 13.71\ V$$

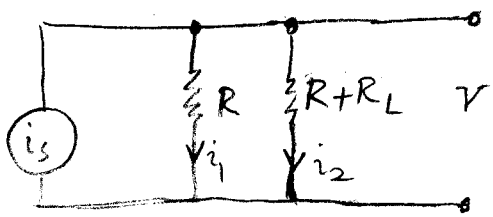
$$\boxed{V_y = 13.71\ V}$$

$$V_z = R_z \frac{V_T}{R_{eq}} = 4 \frac{24}{14} = 6.85\ V \quad , \quad V_x + V_y + V_z = V_T = 24\ V$$

Problem 2.61

$$\frac{i_k}{\frac{1}{R_k}} = \frac{i_{total}}{\frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}}$$

Let us find current for R_L, so we have



$$i_2 = \frac{\left(\frac{1}{R+R_L}\right) i_s}{\frac{1}{R} + \frac{1}{R+R_L}}$$

We know that $V_L = i_2 \cdot R_L = \dfrac{\left(\frac{1}{R+R_L}\right) i_s R_L}{\frac{1}{R} + \frac{1}{R+R_L}}$

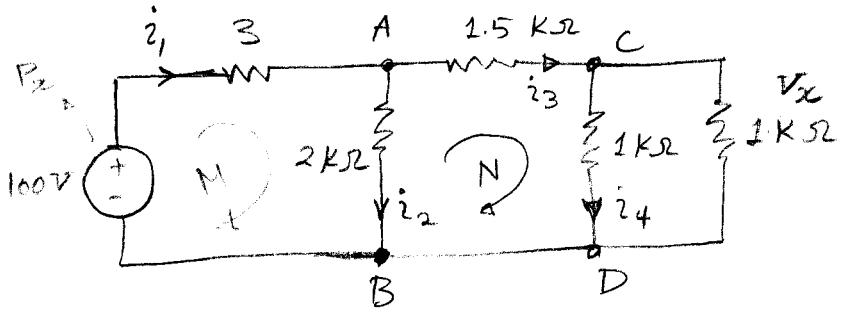
Problem 2.75

$(1 \parallel 1) \longrightarrow R_1 = \frac{1}{1+1} = 0.5\ K\Omega$

0.5, 1.5 in series $R_2 = 0.5 + 1.5 = 2\ K\Omega$

$(2 \parallel 2) \longrightarrow R_3 = \frac{2 \times 2}{2+2} = 1\ K\Omega$

1, 3 series $R_{eq} = 4 \longrightarrow$



$i_1 = \frac{V}{R_{eq}} = \frac{100}{4000} = 0.025\ A$

KVL for loop M: $100 = 0.025 \times 3000 + V_{AB} \longrightarrow V_{AB} = 25\ V$

$i_2 = \frac{V_{AB}}{2000} = \frac{25}{2000} = 0.0125\ A \longrightarrow i_x = -i_2 = -0.0125\ A$

KCL at A $\longrightarrow i_3 = i_1 - i_2 = 0.025 - 0.0125 = 0.0125\ A$

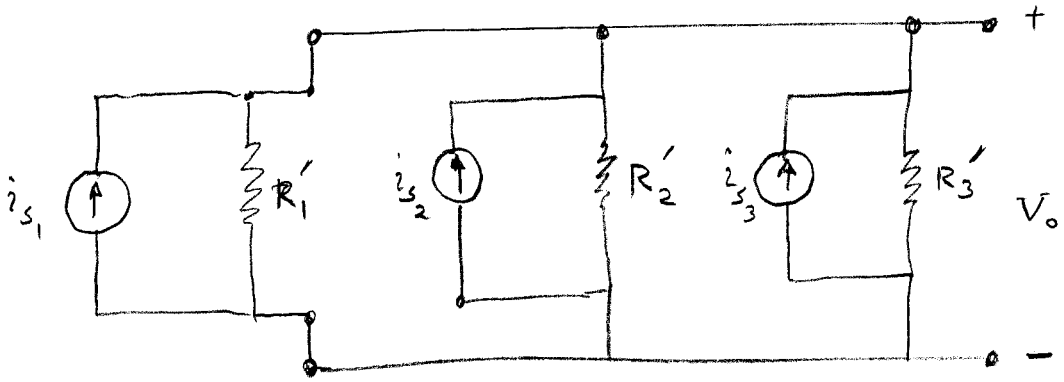
KVL for loop N: $V_{AC} + V_{CD} + V_{BA} = 0 \longrightarrow$

$1500 \times 0.0125 + V_{CD} - 2000 \times 0.0125 = 0 \longrightarrow V_{CD} = 6.25\ V$

$V_{CD} = V_x = 6.25\ V$

$P_x = 100 \times 0.025 = 25\ W$

Problem 2.79



$$i_{s_1} = \frac{v_1}{R} \qquad i_{s_2} = \frac{v_2}{R} \qquad i_{s_3} = \frac{v_3}{R}$$

$$R_1' = \frac{v_1}{i_{s_1}} \qquad R_2' = \frac{v_2}{i_{s_2}} \qquad R_3' = \frac{v_3}{i_{s_3}}$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1'} + \frac{1}{R_2'} + \frac{1}{R_3'} \longrightarrow R_{eq} = \left(\frac{1}{R_1'} + \frac{1}{R_2'} + \frac{1}{R_3'} \right)^{-1} \longrightarrow$$

$$V_o = (i_{s_1} + i_{s_2} + i_{s_3})\, R_{eq}.$$