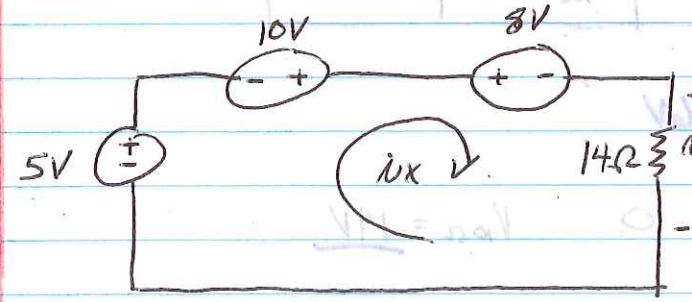
EE2013 - Fall 2014 Recitation 3 09.16.14

KCL: $\sum_{n=1}^{N} i_n = 0$ KVL: $\sum_{n=1}^{N} v_n = 0$



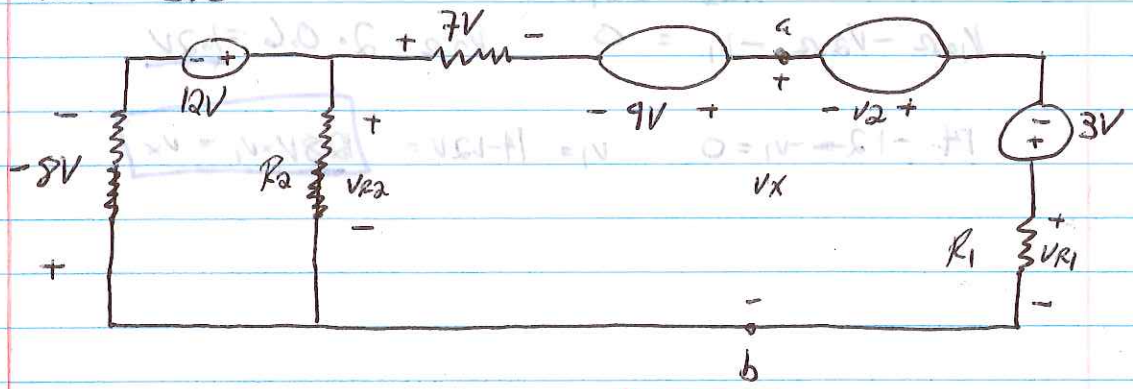
$V = IR$

$I = \frac{V}{R}$

$5 + 10 - 8 - v_x = 0 \quad \therefore v_x = 7V$

$i_x = \frac{7V}{14\Omega} = 500mA$

Practice 3.3



KVL 1st Loop: $-8 - 12 + v_{R2} = 0 \quad \therefore v_{R2} = 20V$

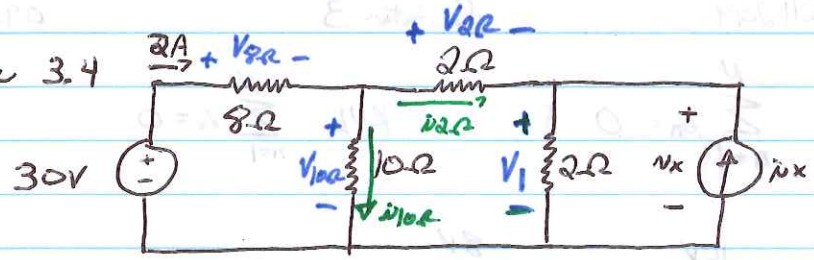
if $v_{R1} = 1V$

KVL 2nd Loop: $20 - 7 + 9 + v_2 + 3 - 1 = 0$

$v_2 + 24 = 0$

$v_2 = -24V$

Practice 3.4



$V = IR$

$V_{8\Omega} = 2 \cdot 8 = 16V$

$30 - 16 - V_{10\Omega} = 0$ $\quad V_{10\Omega} = 14V$

$i_{10\Omega} = \frac{14V}{10\Omega} = 1.4A$

$2A - i_{2\Omega} - i_{10\Omega} = 0$

$2 - i_{2\Omega} - 1.4 = 0$

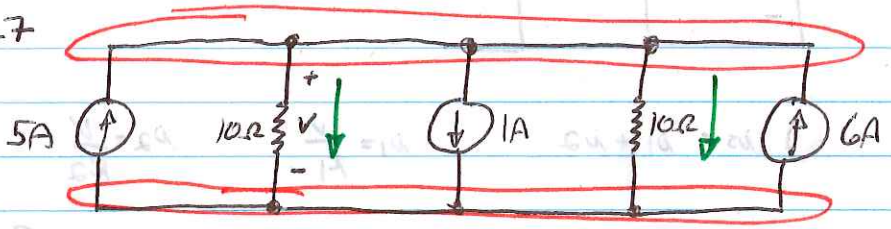
$i_{2\Omega} = 0.6A$

$V_{10\Omega} - V_{2\Omega} - V_1 = 0$ $\quad V_{2\Omega} = 2 \cdot 0.6 = 1.2V$

$14 - 1.2 - v_1 = 0$ $\quad v_1 = 14 - 1.2V = 12.8V = v_1 = v_x$

Power $\sum P_{absorbed} = \sum P_{supplied}$

Practice 3.7



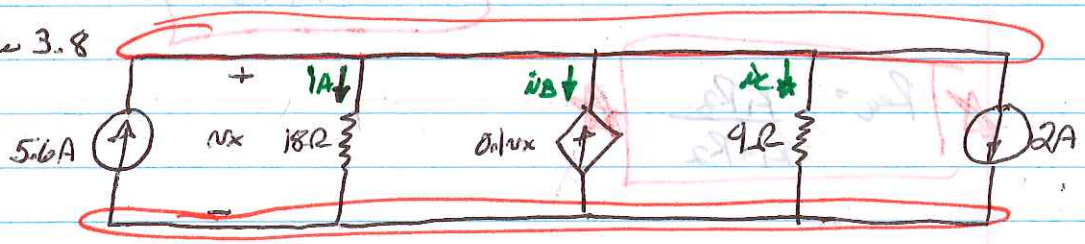
$V = IR$

$5 - \frac{v}{10} - 1 - \frac{v}{10} + 6 = 0$ $\quad 10 - \frac{2v}{10} = 0$

$10 = \frac{2v}{10}$ $\quad 100 = 2v$

$v = 50V$

Practice 3.8



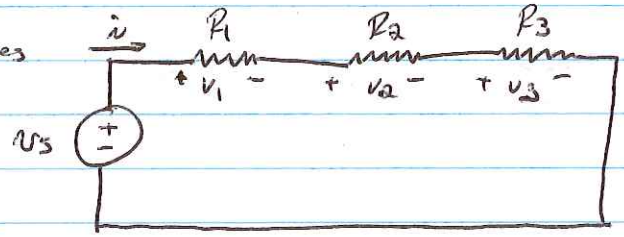
$5.6 - \frac{v_x}{18} + \frac{v_x}{10} - \frac{v_x}{9} - 2$

$3.6 - \frac{v_x}{15} = 0$ $\quad v_x = 54$

$i_A = \frac{54}{18} = 3A = i_A$ $\quad i_B = -0.1 \times 54 = -5.4 = i_B$

$i_C = \frac{54}{9} = 6A = i_C$

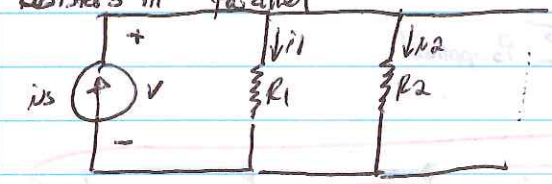
Resistors in Series



$v_s = R_1 i + R_2 i + R_3 i \Rightarrow v_s = i(R_1 + R_2 + R_3)$

$\frac{V}{I} = R \Rightarrow \frac{v_s}{i} = R_1 + R_2 + R_3$

Resistors in Parallel



$i_S = i_1 + i_2$ $\quad i_1 = \frac{V}{R_1}$ $\quad i_2 = \frac{V}{R_2}$

$i_S = \frac{V}{R_1} + \frac{V}{R_2}$ multiply Both sides by $R_1 R_2$

$R_1 R_2 i_S = R_2 V + R_1 V$ $\quad i_S R_1 R_2 = V(R_1 + R_2)$ $\quad R = \frac{V}{i}$

$$\frac{V}{i_S} = \frac{R_1 R_2}{R_1 + R_2}$$

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2}$$