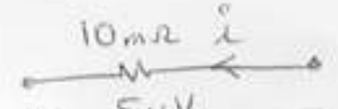
HW #2 Solution

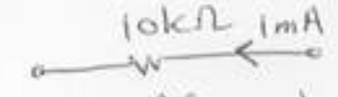
2.2-5:

a) 

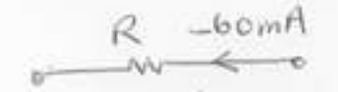
$v = -Ri = -2 \times 8 = \underline{-16V}$ $\quad p = -vi = -(-16)8 = \underline{128W}$

b) 

$i = -\frac{v}{R} = -\frac{5\times10^{-6}}{10\times10^{-3}} = \underline{-0.5mA}$ $\quad p = -vi = +(0.5)(5)10^{-9} = \underline{2.5nW}$

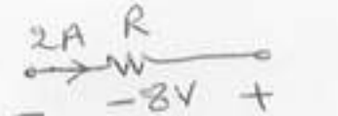
c) 

$v = Ri = 10\times10^{3}\times1\times10^{-3} = \underline{10V}$ $\quad p = vi = 10\times1mA = \underline{10mW}$

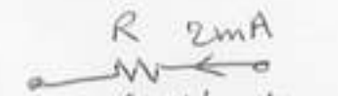
d) 

$v = -Ri$ $\quad p = -vi = 5\times(-60)\times10^{-6} = \underline{0.3mW}$

$R = -\frac{v}{i} = -\frac{5mV}{-60mA} = \underline{0.083\Omega}$

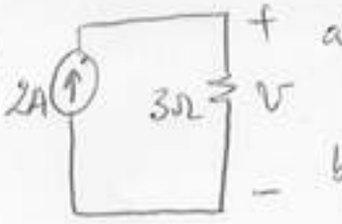
e) 

$R = -\frac{v}{i} = -\frac{-8}{2} = \underline{4\Omega}$ $\quad p = -(-8)(2) = \underline{16W}$

f) 

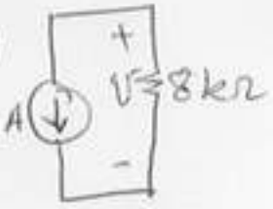
$R = +\frac{v}{i} = \frac{6\mu}{2m} = \underline{3m\Omega}$ $\quad p = vi = 6\mu\times2m = \underline{12nW}$

2.2-7:

a) 

a) $v = Ri = 3\times2 = \underline{6V}$,

b) $v = -Ri = -8\times4 = \underline{32V}$

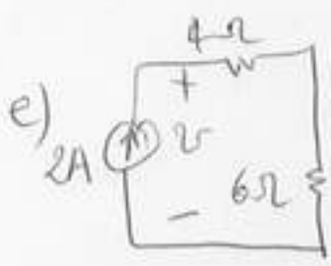


c) 

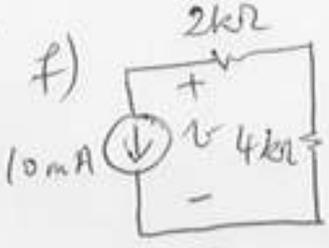
$v = Ri = \underline{20mV}$

d) 

$v = -Ri = -5\times10 = \underline{-50V}$

e) 

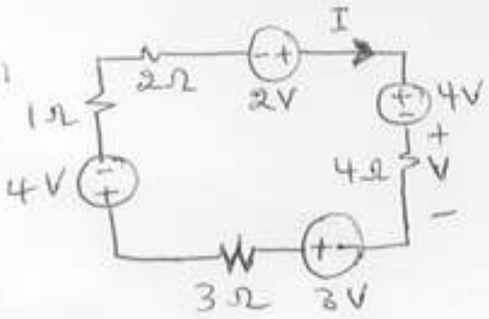
$v = Ri = 10\times2 = \underline{20V}$

f) 

$v = -Ri = -6k\times10m = \underline{-60V}$

HW #2 Solution (cont)

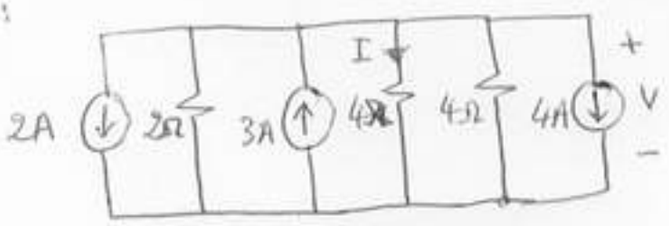
2.3-2:



$$I = \frac{\sum(\text{Voltages})}{\sum(\text{Resistances})} = \frac{2-4+3-4}{1+2+4+3} = -0.3\,A$$

$$V = RI = 4\times(-0.3) = -1.2\,V$$

2.3-8:



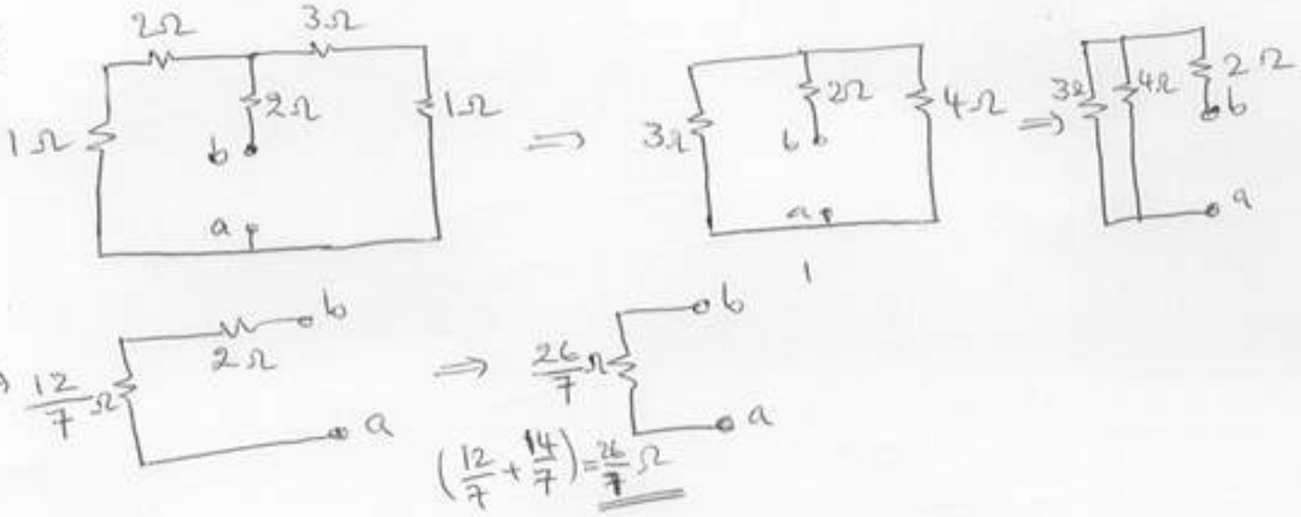
$$2 + \frac{V}{2} - 3 + \frac{V}{4} + \frac{V}{4} + 4 = 0$$

$$V\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{4}\right) + 2 - 3 + 4 = 0$$

$$V + 3 = 0 \Rightarrow V = -3V$$

$$I = \frac{V}{4} = -\frac{3}{4}\,A$$

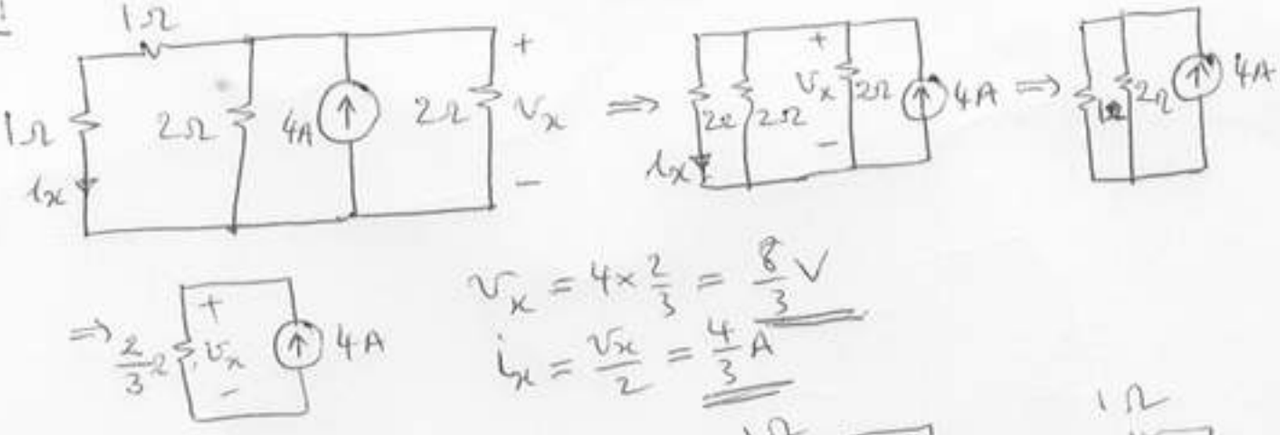
2.4-3:



$$\Rightarrow \frac{12}{7}\,\Omega$$

$$\left(\frac{12}{7}+\frac{14}{7}\right) = \frac{26}{7}\,\Omega$$

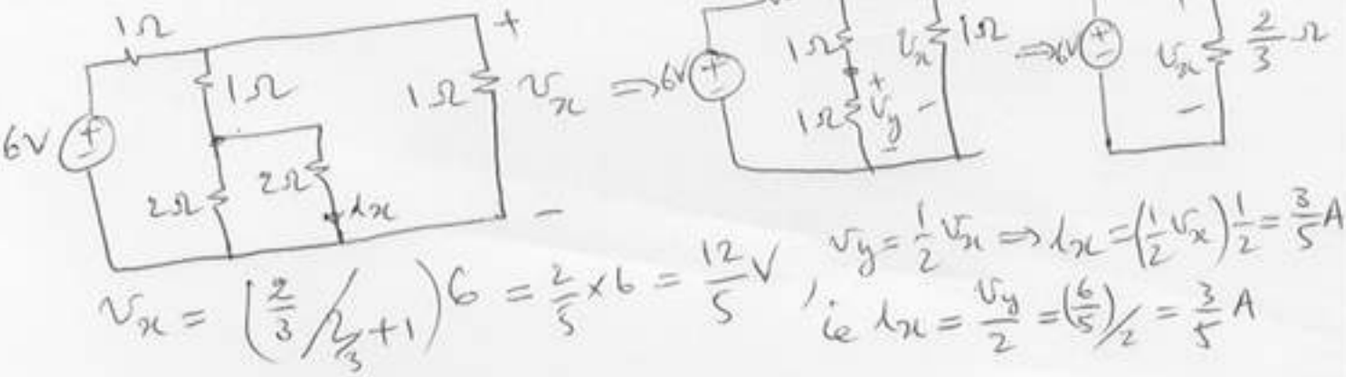
2.4-10:



$$v_x = 4\times\frac{2}{3} = \frac{8}{3}\,V$$

$$i_x = \frac{v_x}{2} = \frac{4}{3}\,A$$

2.5-7:

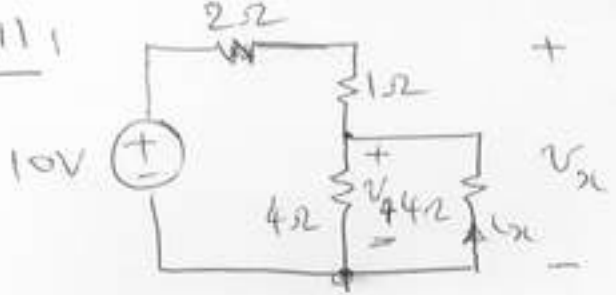


$$v_x = \left(\frac{2}{3}\,/\!/\,2+1\right)6 = \frac{2}{5}\times 6 = \frac{12}{5}\,V$$

$$v_y = \frac{1}{2}v_x \Rightarrow i_x = \left(\frac{1}{2}v_x\right)\frac{1}{2} = \frac{3}{5}\,A$$

$$\text{i.e. } i_x = \frac{v_y}{2} = \left(\frac{6}{5}\right)/2 = \frac{3}{5}\,A$$

2.5-11:



$$v_4 = \frac{2}{2+3}10 = 4V$$

$$v_x = \frac{3}{2+3}10 = 6V$$

v_x is applied through $1\Omega + (4\|4)\Omega$ i.e. 3Ω

$$i_x = -\frac{v_4}{4} = -\frac{4}{4} = -1A$$

v_4 can also be found from:

$$v_4 = \frac{2}{1+2}v_x = \frac{2}{3}\times 6 = 4V$$