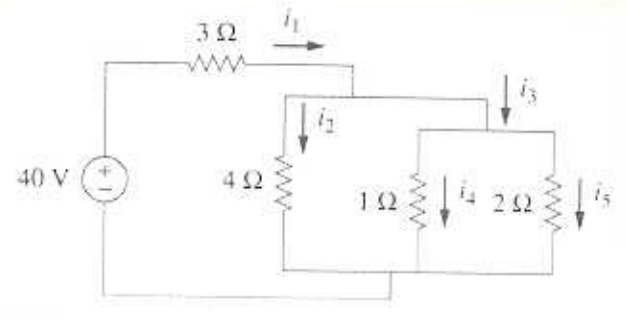
EE 331 PS3 | P2.31, 2.32, 2.36, 2.39

P2.31 Find i_1 through i_5.



$1 \| 2 = 2/3\ \Omega$

$2/3 \| 4 = \frac{8}{3}\left(\frac{3}{14}\right) = \frac{4}{7}\ \Omega$

$i_1 = \frac{40\text{ V}}{3 + 4/7} = 40 \cdot \frac{7}{25} = \frac{56}{5}$

$\boxed{i_1 = 11.2\text{ A}}$

current dividers...

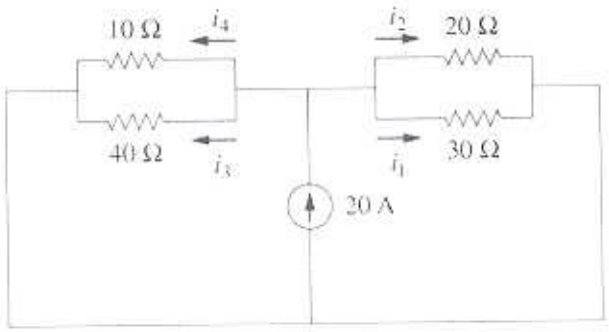
$i_2 = \frac{2/3}{4 + 2/3} \cdot i_1 = \frac{2}{3} \cdot \frac{3}{14} \cdot \frac{56}{5} = \boxed{1.6\text{ A}}$

$i_3 = i_1 - i_2 = 11.2 - 1.6 = \boxed{9.6\text{ A}}$

$i_4 = \frac{2}{1+2} \cdot 9.6 = \boxed{6.4\text{ A}}$

$i_5 = i_3 - i_4 = 9.6 - 6.4 = \boxed{3.2\text{ A}}$

P2.32 Find i_1 to i_4.



$10 \| 40 = 8\ \Omega \qquad 20 \| 30 = 12\ \Omega$

$R_{eq} = 8 \| 12 = 4.8\ \Omega$

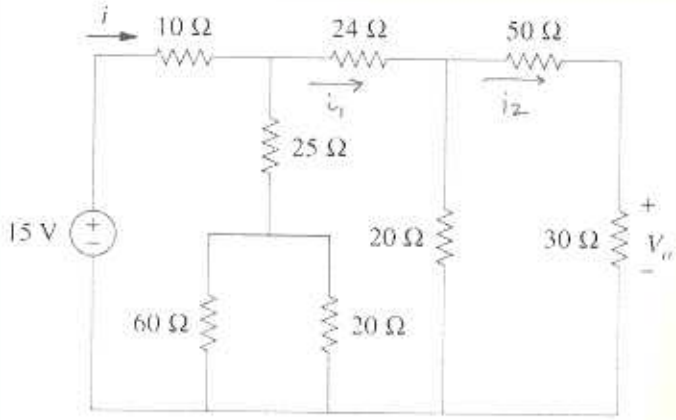
$i_1 = \frac{R_{eq}}{30\ \Omega} \cdot 20 = \boxed{3.2\text{ A}}$

$i_2 = \frac{4.8}{20} \cdot 20 = \boxed{4.8\text{ A}}$

$i_3 = \frac{4.8}{40} \cdot 20 = \boxed{2.4\text{ A}}$

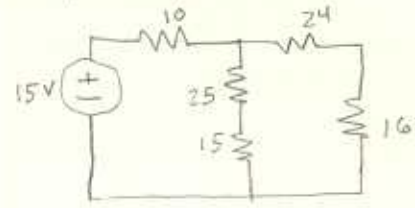
$i_4 = \frac{4.8}{40} \cdot 20 = \boxed{9.6\text{ A}}$

P 2.36



$20 \| 60 = 15\ \Omega$

$20 \| (50+30) = 16\ \Omega$



$(15+25) \| (16+24) = 40 \| 40 = 20\ \Omega$

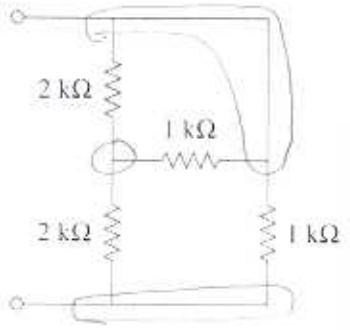
$$i = \frac{15\ V}{(10+20)} = \boxed{0.5\ A}$$

$$i_1 = \frac{40}{40+40} \cdot i = \frac{1}{4}\ A$$

$$i_2 = \frac{20}{20+50+30} \cdot i_1 = \frac{1}{5} \cdot \frac{1}{4} = \frac{1}{20}\ A$$

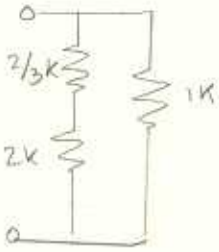
$$V_o = i_2 \cdot 30\ \Omega = \frac{30}{20} = \boxed{1.5\ V}$$

P2.39



(a)

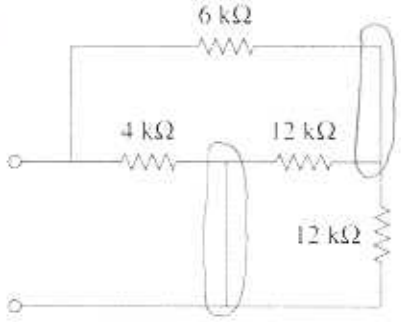
$2k \| 1k = 2/3\ k\Omega$



$(2 + 2/3) \| 1$

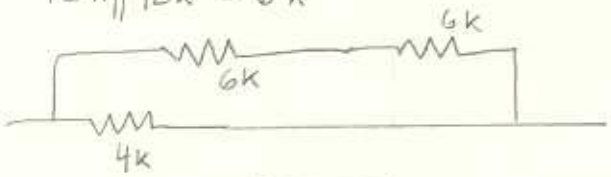
$$= \frac{8}{3} \cdot \frac{3}{11} = \frac{8}{11}\ k\Omega$$

$$\boxed{R_{eq} = 727\ \Omega}$$



(b)

$12k \| 12k = 6k$



$4 \| (6+6) = \boxed{3k\Omega}$