



Figure P3.1

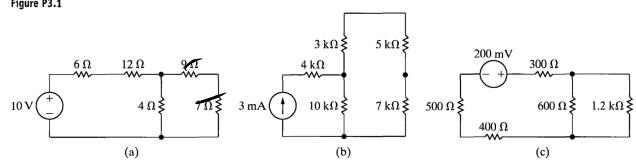
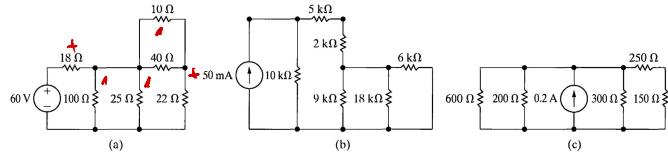


Figure P3.2



a)  $((9+7)\parallel 4 + 6 + 12) = 21.2 \Omega$

b)  $((3+5+7)\parallel 10) + 4 = 10k \Omega$

c)  $(1.2k\parallel 600) + 300 + 400 + 500 = 1600 \Omega$

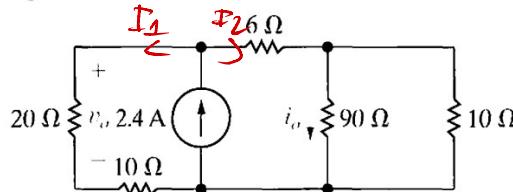
d)  $((10\parallel 40) + 22)\parallel 25\parallel 100 + 18 = 30 \Omega$

e)  $((6\parallel 18)\parallel 9 + 2 + 5)\parallel 10 = 5k \Omega$

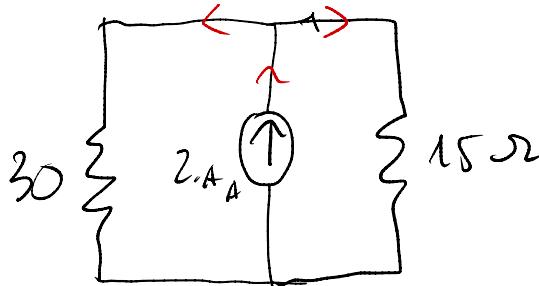
f)  $(600\parallel 200)\parallel ((250+150)\parallel 300) = 80 \Omega$

- a)  $v_o, i_o$   
 b)  $P_{6\Omega}$   
 c)  $P_{10\Omega}$

Figure P3.11



a)



$$I_1 = 2.4 \times \frac{15}{15 + 30} = 0.8 \text{ A}$$

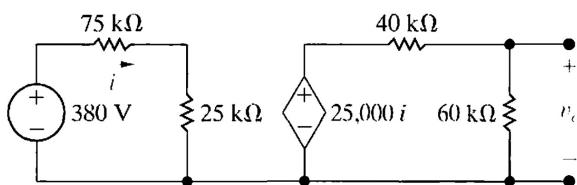
$$I_2 = 2.4 \times \frac{30}{30 + 15} = 1.6 \text{ A}$$

$$v_o = 1.6 \times \frac{10}{30 + 15} = 0.16 \text{ A}$$

b)  $P_{6\Omega} = I_2^2 \times R = (1.6)^2 \times 6 = 15.36 \text{ W}$

$$P_{10\Omega} = \frac{V^2}{R} = \frac{24^2}{(30 + 15)} = 57.6 \text{ W}$$

$$v_o = I_1 R = 0.8 \times 30 = 24 \text{ V}$$



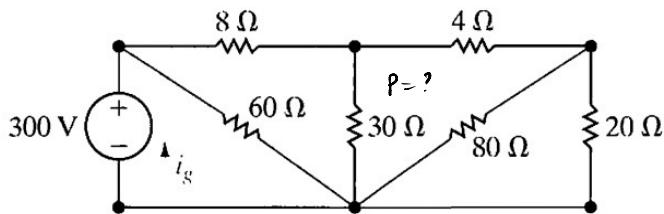
$$i = \frac{380}{100 \text{ k}} = 3.8 \text{ mA}$$

$$v_o = (25,000 i) \left( \frac{60 \text{ k}}{100 \text{ k}} \right) = 57 \text{ V}$$

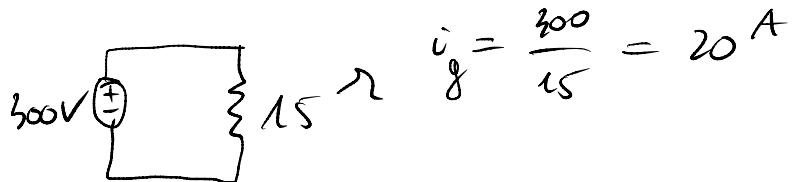
Figure P3.29

a)  $v_g$

b)  $P_{30\text{-}\Omega}$



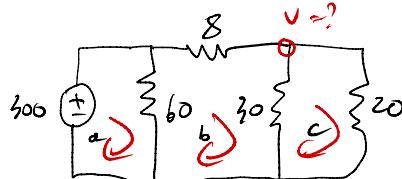
$$((((20 \parallel 80) + 4) \parallel 30) + 8) \parallel 60 = 15 \Omega$$



$$60(i_b - 20) + 8i_b + 30(i_b - i_c) = 0$$

$$30(i_c - i_b) + 20i_c = 0$$

$$\begin{cases} i_b = 15 \text{ A} \\ i_c = 9 \text{ A} \end{cases}$$

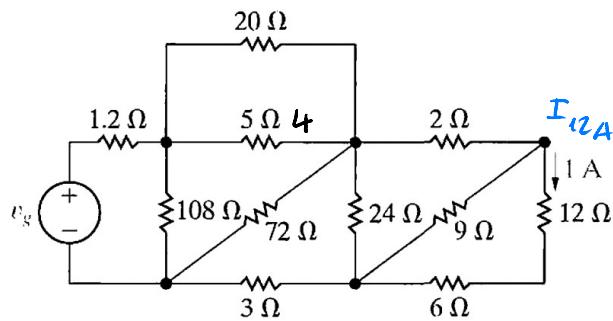


$$v = 30(i_b - i_c) = 180 \text{ V} \quad \begin{cases} i_c = 9 \text{ A} \end{cases}$$

$$P = \frac{V^2}{R} = \frac{180^2}{30} = 1080 \text{ W}$$

$$v_g = ?$$

$$P_{20\Omega} = ?$$



$$((12+6) \parallel 9+3) \parallel 24+3 = 8 \Omega$$

$$(8+4) \parallel 10.8 = 10.8 \Omega$$

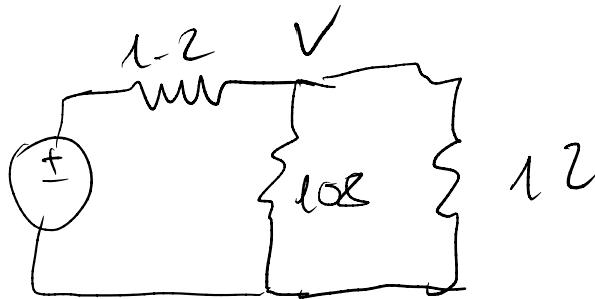
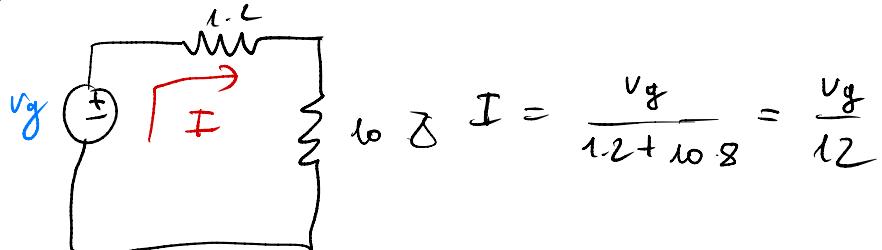
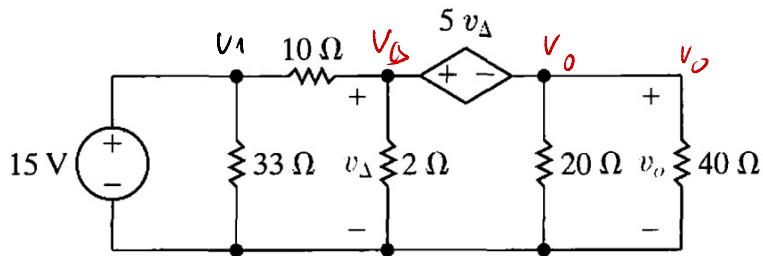
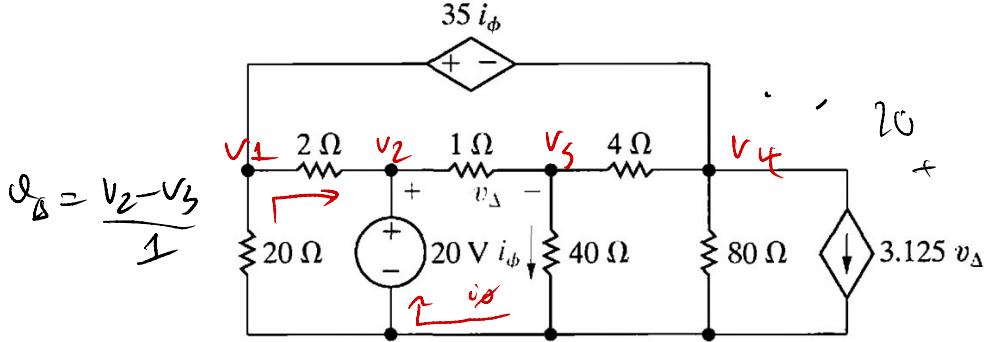


Figure P4.27



$$v_1 = 15 \text{ V}$$

Node (1) to (2):



$$i_\phi = \frac{v_2 - v_3}{1}$$

$$v_2 = 20 \text{ V}$$

(1) (2)

$$\frac{v_1}{20} + \frac{v_1 - 20}{2} + \frac{v_4 - v_3}{4} + \frac{v_4}{80} + 3.125 v_\phi = 0$$

$$\Leftrightarrow \frac{v_1}{20} + \frac{v_1}{2} + \frac{v_4 - v_3}{4} + \frac{v_4}{80} + 3.125(20 - v_3) = 10 \quad (1)$$

$$\text{Node (3): } \frac{v_3 - 20}{1} + \frac{v_3}{40} + \frac{v_3 - v_4}{4} = 0 \quad (2)$$

$$i_\phi = \frac{v_3}{40}$$

$$35i_\phi = v_1 - v_4 \Leftrightarrow v_1 - \frac{7v_3}{8} - v_4 = 0 \quad (3)$$

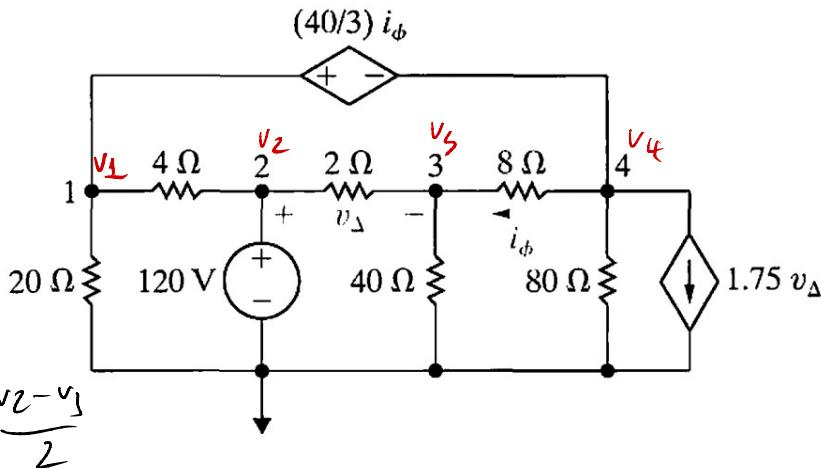
$$\left\{ \begin{array}{l} v_1 = -20.25 \text{ V} \\ v_3 = 10 \text{ V} \\ v_4 = -20 \text{ V} \end{array} \right. \quad \left| \begin{array}{l} I_{2,32} = \left( \frac{v_1 - v_2}{2} \right) \\ = -20.125 \text{ A} \\ i_\phi = \frac{10}{40} = 0.25 \end{array} \right.$$

$$\Rightarrow P_{20} = (20)(-20.375) = -407.5 \text{ W}$$

$\Rightarrow P_{20}$  is generated to the circuit  $407.5 \text{ W}$

Figure P4.29

$$V_C =$$



$$V_D = \frac{v_2 - v_3}{2}$$

$$i_d = \frac{v_4 - v_3}{8}$$

$$\frac{40v_d}{5} = v_4 - v_1 \quad (\Rightarrow) \quad \frac{3}{3} v_4 - \frac{320v_3}{3} + v_1 = 0 \quad (1)$$

$$(1)(4): \quad \frac{v_1}{20} + \frac{v_1 - 120}{4} + \frac{v_4 - v_3}{8} + \frac{v_4}{80} + 1.75v_d = 0$$

$$(\Rightarrow) \quad \frac{v_1}{20} + \frac{v_1 - 120}{4} + \frac{v_4 - v_3}{8} + \frac{v_4}{80} + 1.75 \left( \frac{120 - v_3}{2} \right) = 0 \quad (2)$$

Node 3:

$$\frac{v_3 - 120}{2} + \frac{v_3 - v_4}{8} + \frac{v_3}{40} = 0 \quad (3)$$

$$\left\{ \begin{array}{l} v_1 \\ v_3 = \\ v_4 = \end{array} \right.$$