

$$P4.23 \text{ b) } i_0 = \frac{v_2 - v_3}{50} = \frac{-30 - 2.5}{50} = -0.65 \text{ A}$$

$$i_3 = \frac{v_3 - 5i_0}{5} = \frac{2.5 - 5(-0.65)}{5} = 1.15 \text{ A}$$

$$i_g = \frac{38.5 - 2.5}{20} = 1.8 \text{ A}$$

$$\sum P_{\text{dis}} = \sum P_{\text{dev}}$$

$$P_{2i_0} = -2i_0 v_1 = -2(-0.65)(-50) = -65 \text{ W (developed)}$$

$$P_{5i_0} = 5i_0 i_3 = 5(-0.65)(1.15) = -3.7375 \text{ W (dev.)}$$

$$P_g = -38.5(1.8) = -69.30 \text{ W (dev.)}$$

$$\sum P_{\text{dev}} = 65 + 3.7375 + 69.3 = 138.0375 \text{ W}$$

Check :

$$\begin{aligned} \sum P_{\text{dis}} &= \frac{2500}{100} + \frac{900}{200} + \frac{400}{25} + (0.65)^2(50) + (1.8)^2(20) \\ &= 138.0375 \text{ W} \end{aligned}$$

$$\therefore \sum P_{\text{dev}} = \sum P_{\text{dis}} = 138.0375 \text{ W}$$

P4.24 a)

$$-5 + \frac{v_1}{15} + \frac{v_1 - v_2}{5} = 0 \Rightarrow 4v_1 - 3v_2 = 75 \quad (1)$$

$$\frac{v_2 - v_1}{5} + \frac{v_2}{30} + \frac{v_2}{10} + \frac{v_2 + 5i_\Delta}{30} = 0 \Rightarrow -6v_1 + 11v_2 + 5i_\Delta = 0 \quad (2)$$

$$\text{but } i_\Delta = \frac{v_1 - v_2}{5}, \text{ so } v_1 - v_2 - 5i_\Delta = 0 \quad (3)$$

$$\text{Solving } v_1 = 30 \text{ V, } v_2 = 15 \text{ V, } i_\Delta = 3 \text{ A, } i_\sigma = \frac{15 + 15}{30} = 1 \text{ A}$$

P 4.24 a) continued

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$$P_{5i_{\Delta}} = (-15)(1) = -15 \text{ W (del)}$$

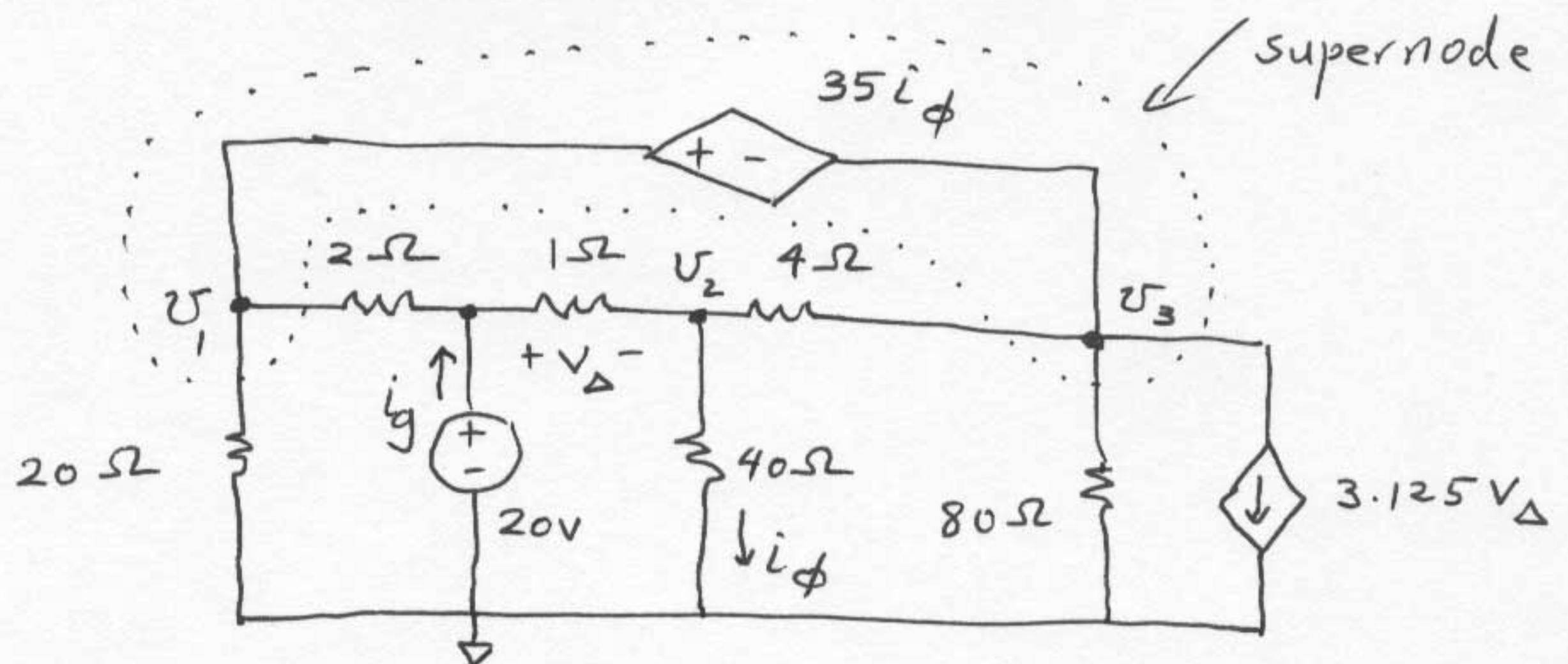
$$P_{5A} = -5(30) = -150 \text{ W (del)}$$

$$\therefore P_{\text{dev}} = 165 \text{ W}$$

$$b) \sum P_{\text{abs}} = \frac{(30)^2}{15} + \frac{(15)^2}{30} + \frac{(15)^2}{10} + (3)^2(5) + (1)^2(30) = 165 \text{ W}$$

$$\therefore \sum P_{\text{abs}} = \sum P_{\text{dev}} = 165 \text{ W}$$

P 4.26



$$\frac{v_1}{20} + \frac{v_1 - 20}{2} + \frac{v_3 - v_2}{4} + \frac{v_3}{80} + 3.125 v_{\Delta} = 0$$

$$\frac{v_2}{40} + \frac{v_2 - v_3}{4} + \frac{v_2 - 20}{1} = 0$$

$$v_{\Delta} = 20 - v_2$$

$$v_1 - 35 i_{\phi} = v_3$$

$$i_{\phi} = v_2 / 40$$

Solving, $v_1 = -20.25 \text{ V}$, $v_2 = 10 \text{ V}$, $v_3 = -29 \text{ V}$

$$i_g = \frac{20 - (-20.25)}{2} + \frac{20 - 10}{1} = 30.125 \text{ A}$$

$$\therefore P_{20V} = -20(30.125) = -602.5 \text{ W (actually delivered)}$$

P4.32 a)

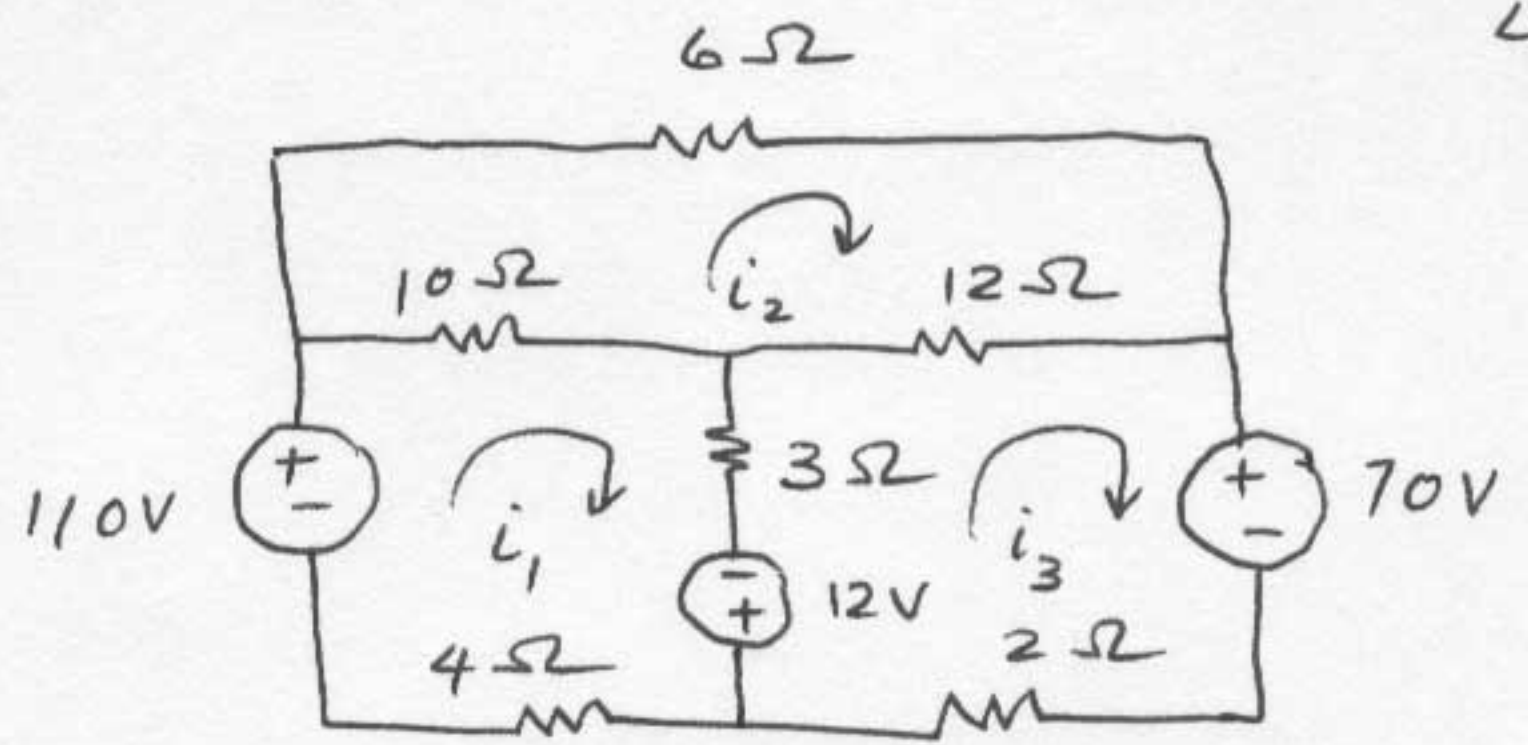
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$$110 + 12 = 17i_1 - 10i_2 - 3i_3$$

$$0 = -10i_1 + 28i_2 - 12i_3$$

$$-12 - 70 = -3i_1 - 12i_2 + 17i_3$$

Solving: $i_1 = 8A$, $i_2 = 2A$, $i_3 = -2A$



$$P_{110V} = -110i_1 = -880W \text{ (del)}$$

$$P_{12V} = -12(i_1 - i_3) = -120W \text{ (del)}$$

$$P_{70V} = 70i_3 = -140W \text{ (del)}$$

$$\therefore \sum P_{\text{dev}} = 1140W$$

$$b) P_{4\Omega} = (8)^2(4) = 256W \quad \cdot \quad P_{10\Omega} = (6)^2(10) = 360W$$

$$P_{12\Omega} = (-4)^2(12) = 192W \quad \cdot \quad P_{2\Omega} = (-2)^2(2) = 8W$$

$$P_{6\Omega} = (2)^2(6) = 24W \quad \cdot \quad P_{3\Omega} = (10)^2(3) = 300W$$

$$\therefore \sum P_{\text{abs}} = 1140W$$