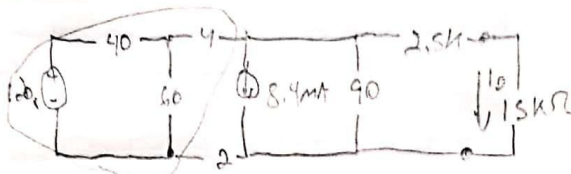
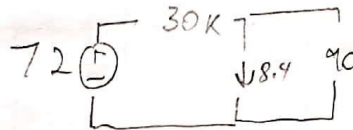
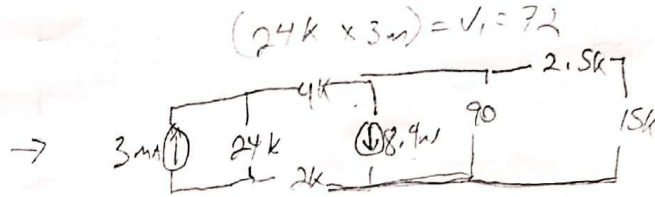
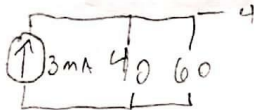


HW 9 (1)



$$\frac{120}{40k} = 3mA$$

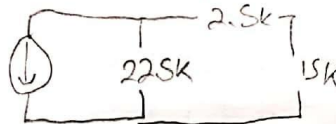


$$\frac{30 \times 90}{30 + 90} = 22.5k$$

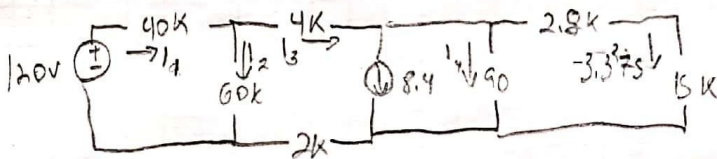
$$\frac{72}{30} = 2.4mA$$

$$I_3 = 8.4mA - 2.4mA = 6mA$$

$$V_3 = 6mA(22.5k) = 135V$$



$$a) \quad I_0 = -\frac{135}{22.5 + 2.5k + 15k} = \boxed{-3.375mA}$$



$$V_1 = -3.375(2.5 + 15)k = -59.0625V$$

$$I_4 = \frac{-59.0625}{90} = \boxed{-.6563mA}$$

$$I_3 = 8.4mA + I_4 - 3.375mA$$

$$= 8.4mA - .6563 - 3.375 = \boxed{4.3687mA}$$

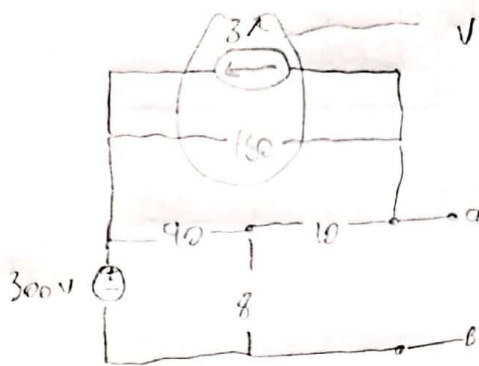
$$V_2 = I_3(4k + 2k) + V_1 = 4.3687(4k + 2k) - 59.0625$$

$$V_2 = -32.8503V$$

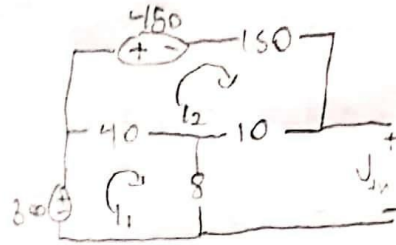
$$I_2 = \frac{-32.8503}{60} = \boxed{-.5475mA}$$

$$I_1 = I_2 + I_3 = -.5475 + 4.3687 = \boxed{3.8212mA}$$

4.149 (2)



$$V = 3(150) = 450V$$



$$\text{mesh } i_1: -300 + 40(i_1 - i_2) + 8i_1 = 0$$

$$48i_1 - 40i_2 = 300$$

$$\text{mesh } i_2: 450 + 150i_2 + 10i_2 + 40(i_2 - i_1) = 0$$

$$-40i_1 + 200i_2 = -450$$

$$\times 5 \quad 240i_1 - 200i_2 = 1500$$

$$200i_1 = 1050$$

$$i_1 = 5.25A$$

$$i_2 = \frac{48i_1 - 300}{40} = -1.24$$

$$V_{Th} = 10i_2 + 8i_1$$

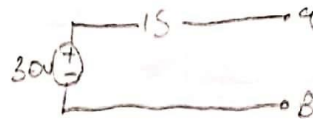
$$= 10(-1.24) + 8(5.25)$$

$$= 30V$$

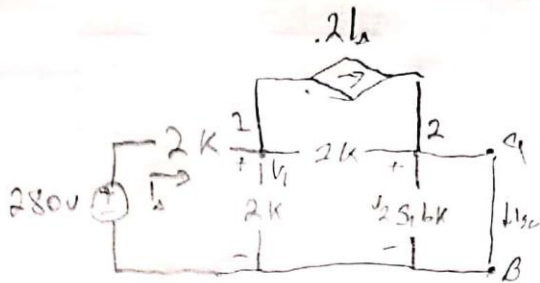
$$R_{Th} = (40 \parallel 8 + 10) \parallel 150$$

$$= \frac{50}{3} \parallel 150$$

$$R_{Th} = 15$$



Homework 9 (3)



$$I_{\Delta} = \frac{280 - V_1}{2000}$$

$$V_2 = 0$$

$$\text{KCL } V_1: \frac{V_1 - 280}{2000} + \frac{V_1}{2000} + \frac{V_1 - V_2}{2000} = -0.2 I_{\Delta}$$

$$2000 \left( \frac{3V_1 - 280 - V_2}{2000} = -0.2 \left( \frac{280 - V_1}{2000} \right) \right)$$

$$3V_1 - 280 = -56 + 0.2V_1$$

$$2.8V_1 = 224$$

$$V_1 = 80V$$

$$I_{\Delta} = \frac{280 - 80}{2000} = 0.1A$$

$$I_{sc} = 0.2I_{\Delta} + \frac{V_1 - V_2}{2000} + \frac{V_2}{5600}$$

$$= 0.2(0.1) + 0.04 = 0.06A$$

$$\text{KCL } V_2: \dots + 1 = \dots$$

$$2.8V_1 = 224 + V_2$$

$$V_1 = \frac{224 + V_2}{2.8}$$

$$R_N = \frac{V_{th}}{I_{sc}} = \frac{112}{0.06} = 1866.7\Omega$$

$$\text{KCL } V_2: \left( \frac{V_2}{5600} + \frac{V_2 - V_1}{2000} \right) = 0.2 I_{\Delta}$$

$$-14V_1 + 19V_2 = 5600 \left( \frac{280 - V_1}{2000} \right)$$

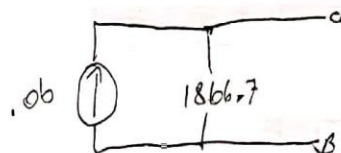
$$-14V_1 + 19V_2 = 784 - 2.8V_1$$

$$-11.2V_1 + 19V_2 = 784$$

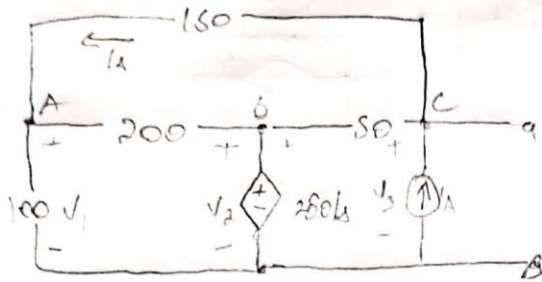
$$-896 - 4V_2 + 19V_2 = 784$$

$$15V_2 = 1680$$

$$V_2 = 112V = V_{th}$$



HW #9 (4)



$$I_A = \frac{V_3 - V_1}{150}$$

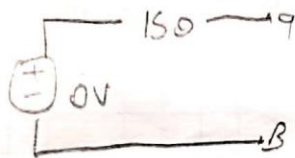
$$V_2 = 250 I_A$$

$$= 250 \left( \frac{V_3 - V_1}{150} \right)$$

$$V_2 = 1.67 V_3 - 1.67 V_1$$

$$R_{th} = \frac{150}{1} = 150 \Omega$$

$$V_{th} = 0$$



$$KCL \text{ A } \frac{V_1}{100} + \frac{V_1 - V_2}{200} + \frac{V_1 - V_3}{150} = 0$$

$$13V_1 - 3V_2 - 4V_3 = 0$$

$$13V_1 - 5V_3 + 5V_1 - 4V_3 = 0$$

$$18V_1 - 9V_3 = 0$$

$$V_1 = \frac{V_3}{2}$$

KCL C

$$\frac{V_3 - V_2}{50} + \frac{V_3 - V_1}{150} = 1$$

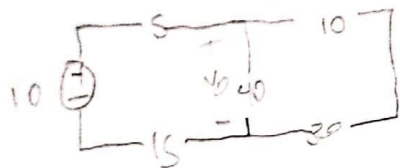
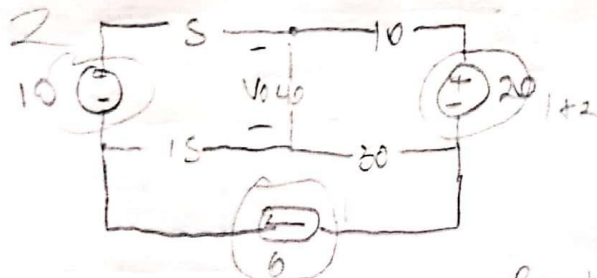
$$-V_1 - 3V_2 + 4V_3 = 150$$

$$4\left(\frac{V_3}{2}\right) - V_3 = 150$$

$$V_3 = 150V$$

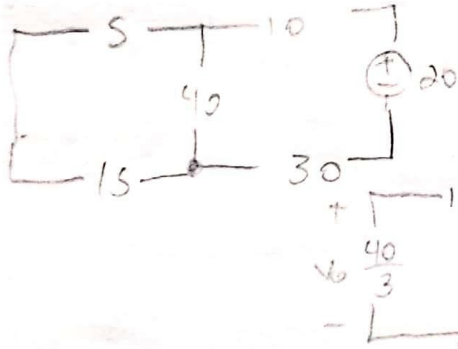


Ans 4a (5)



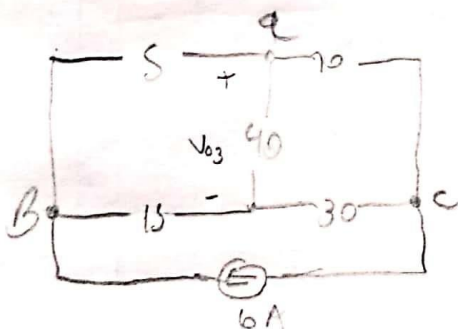
$$R = 10 + 10 \parallel 40 = 20$$

$$V_{01} = \frac{20}{2 + 15 + 5} (10) = 5V$$



$$R = 5 + 15 \parallel 40 = \frac{40}{3}$$

$$V_{02} = \frac{\frac{40}{3}}{\frac{40}{3} + 30 + 10} (20) = 5V$$



$$KVL \quad \frac{V_{03}}{40} + \frac{V_{03} - V_c}{10} + \frac{V_{03} - V_b}{5} = 0$$

$$13V_{03} - 8V_b - 4V_c = 0$$

$$KCL \quad \frac{V_b - V_{03}}{5} + \frac{V_b}{15} - 6 = 0$$

$$-3V_{03} + 4V_b = 90$$

$$V_b = \frac{90 + 3V_{03}}{4}$$

$$KCL \quad \frac{V_c - V_{03}}{10} + \frac{V_c}{30} + 6 = 0$$

$$-3V_{03} + 4V_c = -180$$

$$V_c = \frac{-180 + 3V_{03}}{4}$$

$$13V_{03} - 8\left(\frac{90 + 3V_{03}}{4}\right) - 4\left(\frac{-180 + 3V_{03}}{4}\right) = 0$$

$$4V_{03} = 0 \Rightarrow V_{03} = 0$$

$$V_0 = V_{01} + V_{02} + V_{03} = 5 + 5 + 0 = 10V$$