HW 2 Solution Corrections

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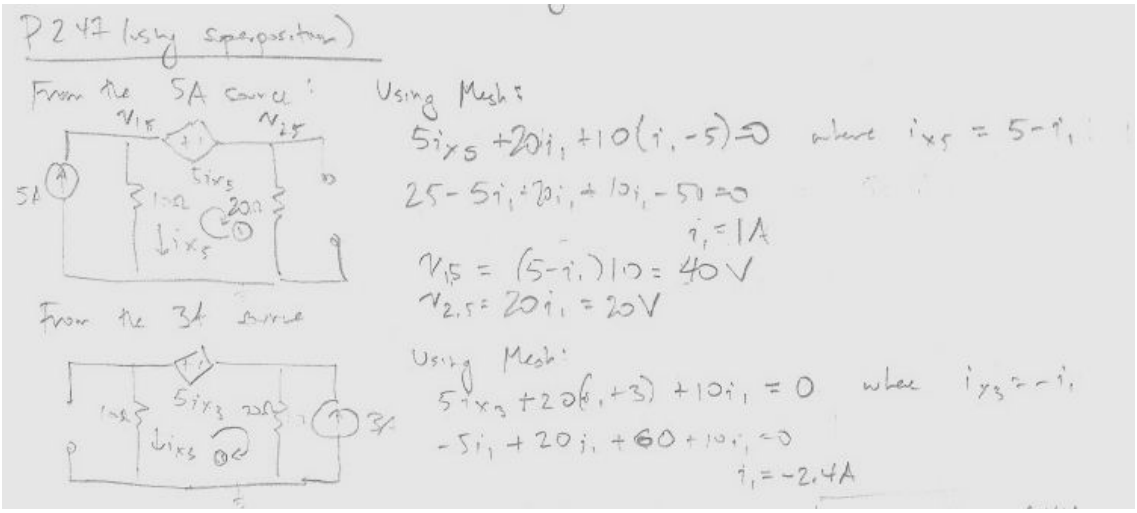
HW2, Problem 2.47



Let V1=V1,5; V2=V2,5

For the circuit on top,

$$\frac{V1}{10} = (5-1)$$

$$V1 = 40V$$

For the circuit on top,

$$\frac{V2}{20} = 1$$

$$V2 = 20V$$

For the circuit at the bottom,

$$\frac{V1}{10} = 2.4$$

$$V1 = 24V$$

For the circuit at the bottom,

$$\frac{V2}{20} = 0.6$$

$$V2 = 12V$$

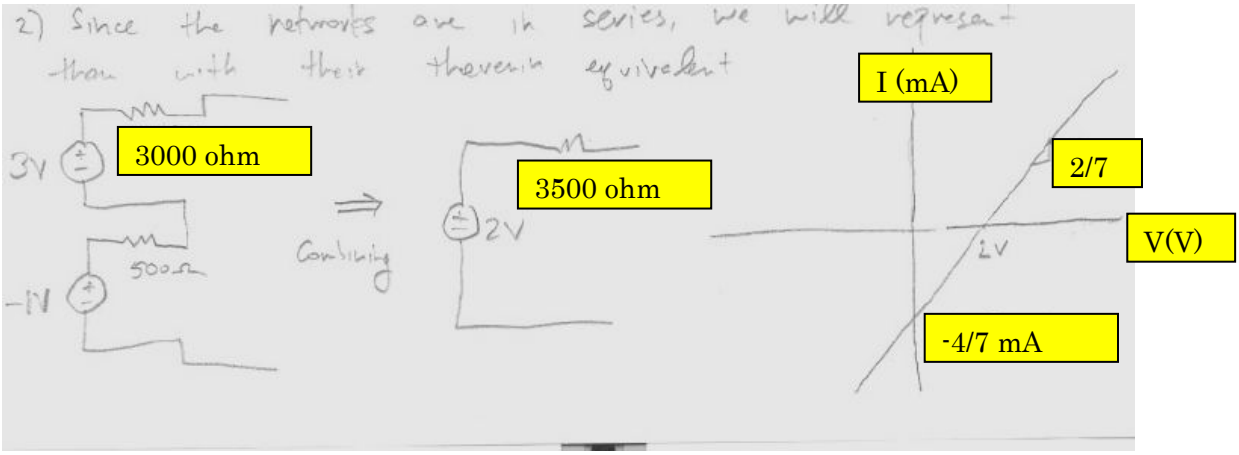
Overall,

$\boxed{\text{V1 = 40V + 24V = 64V}}$

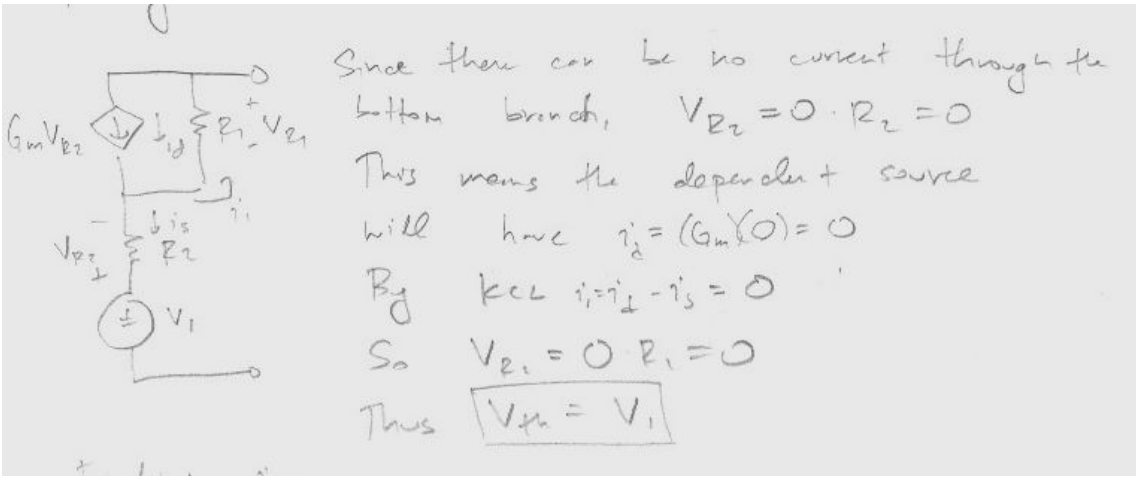
Overall,

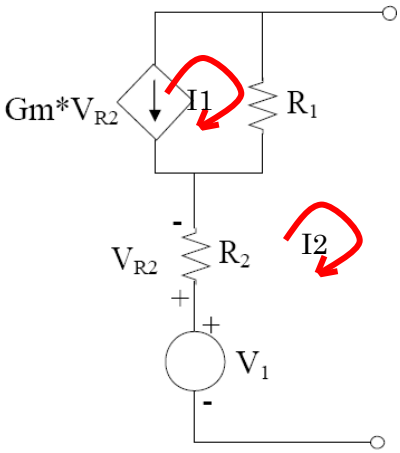
$\boxed{\text{V2 = 20V + 12V = 32V}}$

HW2, Problem 2



HW2, Problem 3





Since

$$I_1 = -Gm \cdot V_{R2}$$

$$V_{R2} = I_{sc} \cdot R_2$$

$$V_{R2} + R_1(I_2 - I_1) - V_1 = 0$$

$$V_{R2} + R_1(I_{sc} + Gm \cdot V_{R2}) - V_1 = 0$$

$$I_{sc} \cdot R_2 + R_1(I_{sc} + Gm \cdot I_{sc} \cdot R_2) - V_1 = 0$$

$$I_{sc} \cdot R_2 + I_{sc} \cdot R_1(1 + Gm \cdot R_2) - V_1 = 0$$

$$I_{sc} \cdot (R_1 + R_2 + Gm \cdot R_1 \cdot R_2) = V_1$$

$$\boxed{I_{sc} = \frac{V_1}{(R_1 + R_2 + Gm \cdot R_1 \cdot R_2)}}$$

$$Rth = \frac{Voc}{Isc} = \frac{V_1}{\frac{V_1}{(R_1 + R_2 + Gm \cdot R_1 \cdot R_2)}} = R_1 + R_2 + Gm \cdot R_1 \cdot R_2$$