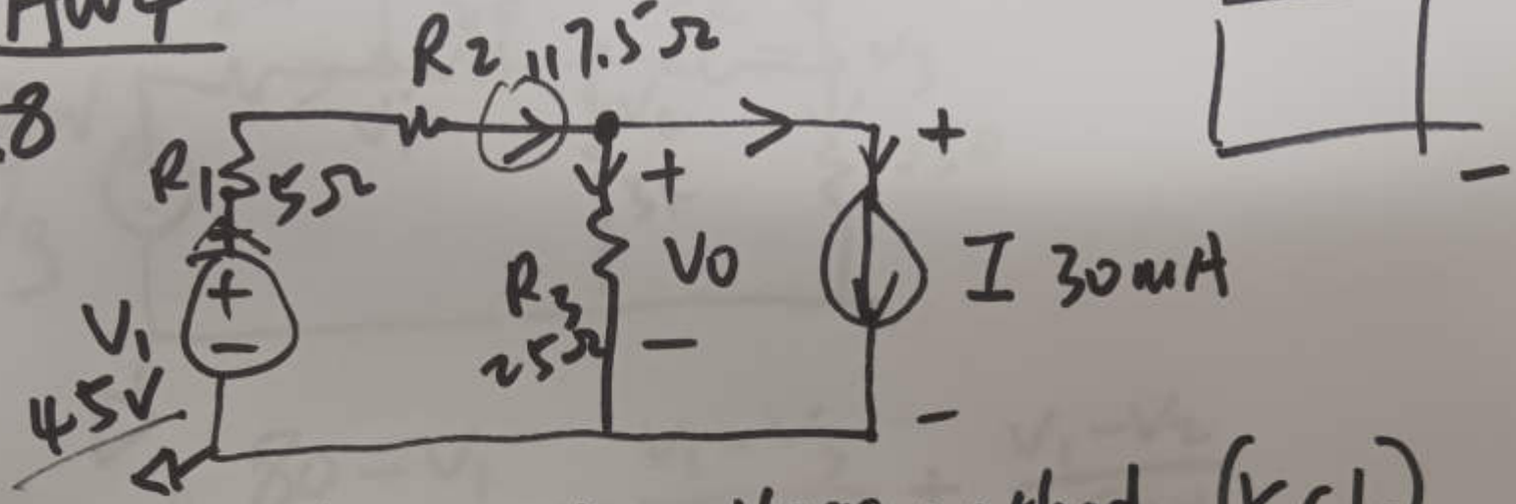
HW4

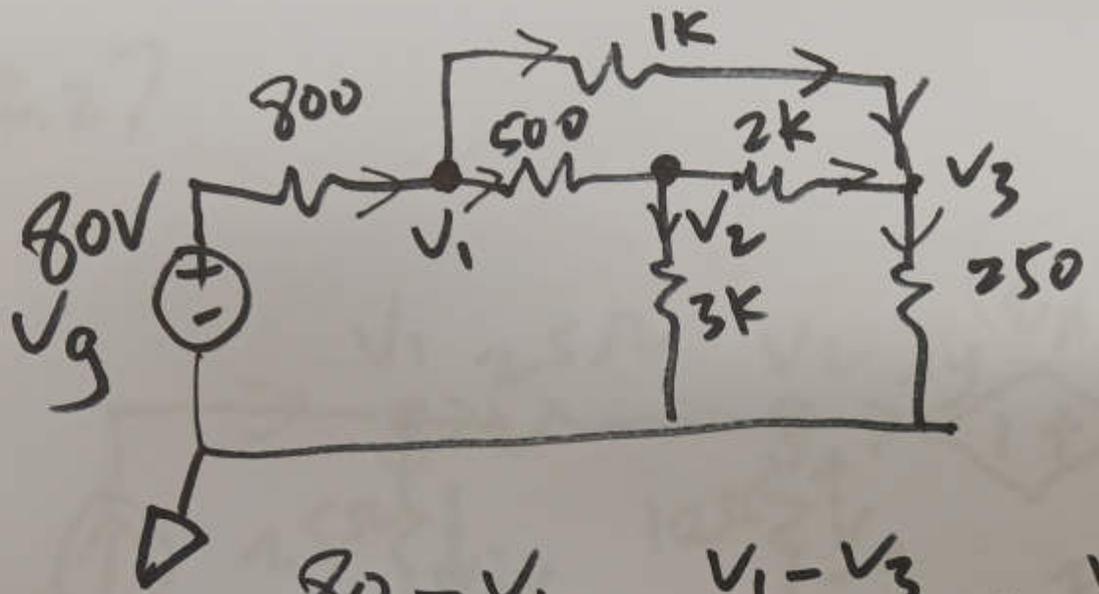
P 4.8



Find V_o node voltage method (KCL)

$$\frac{45 - V_o}{5 + 117.5} = \frac{V_o}{25} + 30 \times 10^{-3}\ A$$

$V_o = +$ □



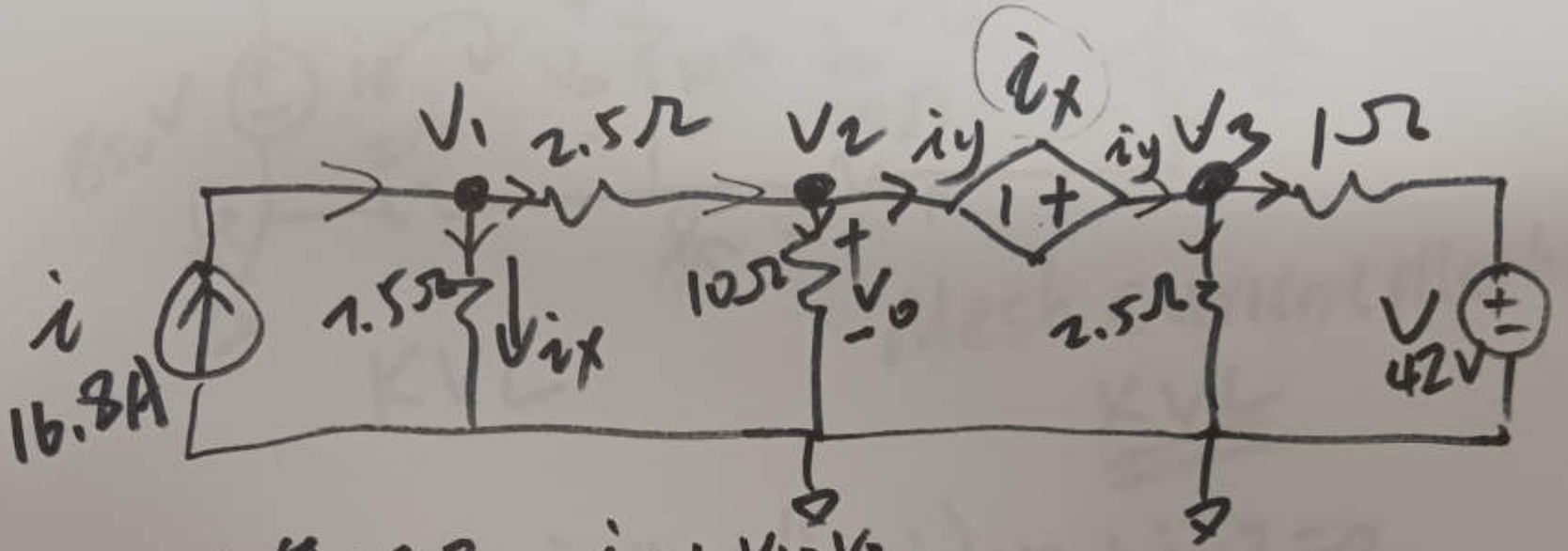
$$\frac{80 - V_1}{800} = \frac{V_1 - V_3}{1K} + \frac{V_1 - V_2}{500}$$

$$\frac{V_1 - V_2}{500} = \frac{V_2 - 0}{3K} + \frac{V_2 - V_3}{2K}$$

$$\frac{V_2 - V_3}{2K} + \frac{V_1 - V_3}{1K} = \frac{V_3 - 0}{250}$$

(2)

P4.27



$16.8 = i_x + \frac{V_1 - V_2}{2.5}$

$V_1\ V_2\ V_3$
$i_x\ i_y$

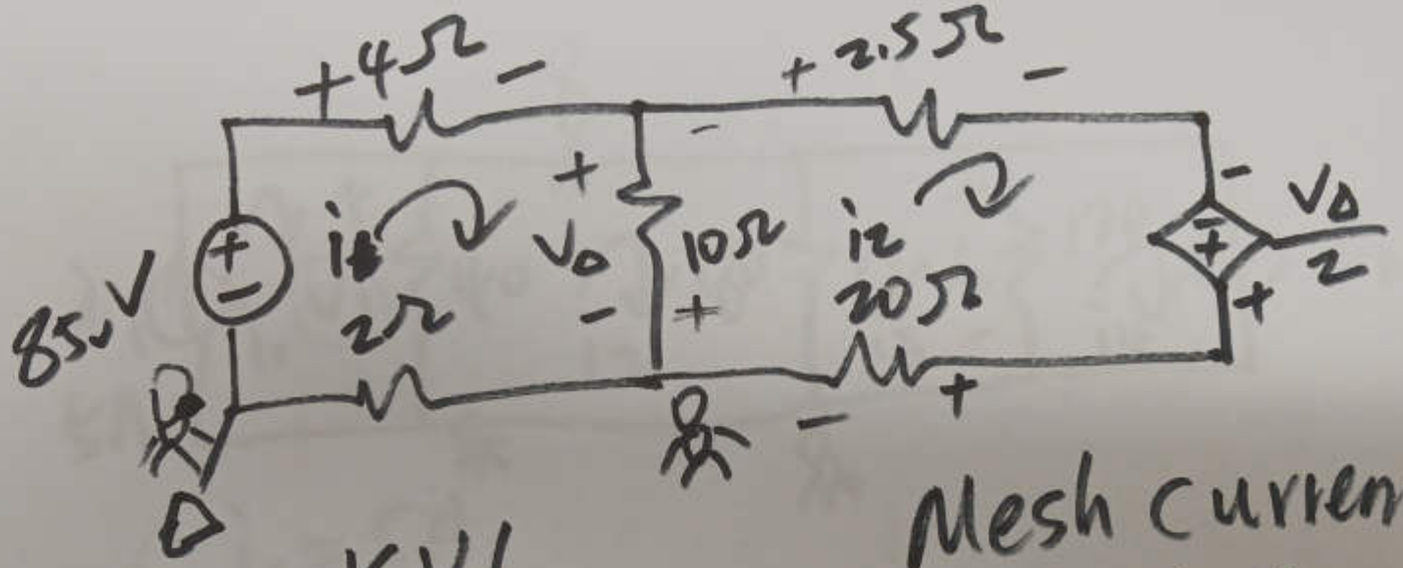
$i_x = \frac{V_1 - 0}{1.5}$

$\frac{V_1 - V_2}{2.5} = \frac{V_2 - 0}{10} + i_y$

$i_y = \frac{V_3 - 42}{1} + \frac{V_3 - 0}{2.5}$

$V_3 - V_2 = i_x$

(3)

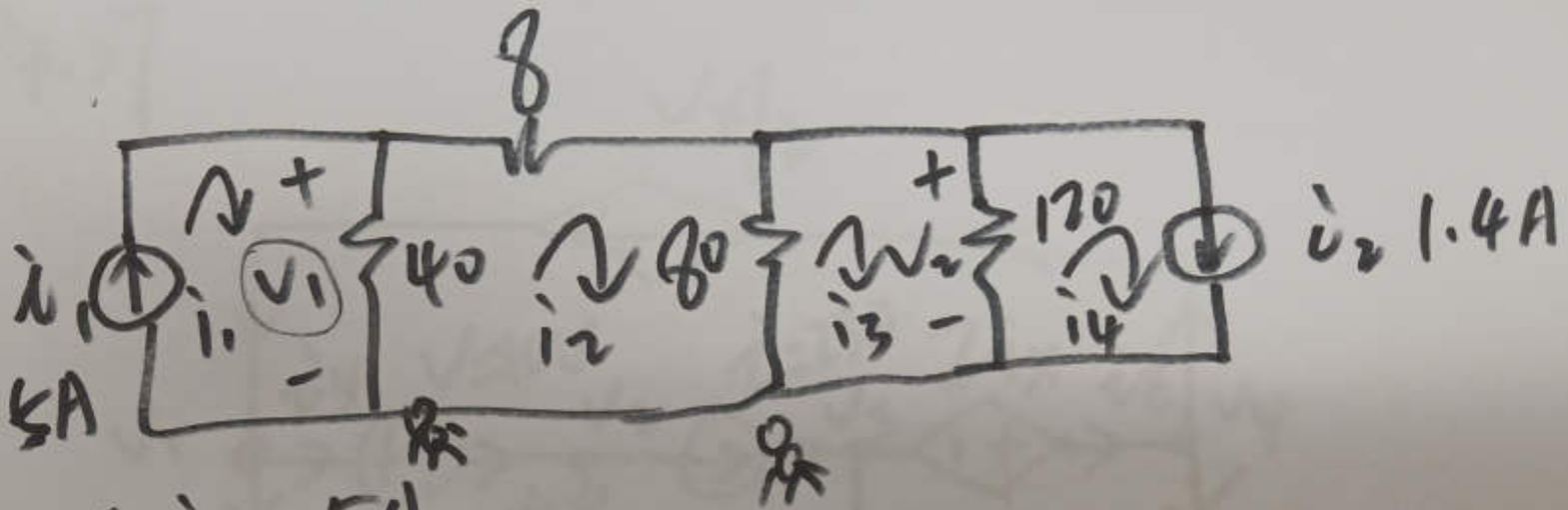


KVL

Mesh Current Method

KVL

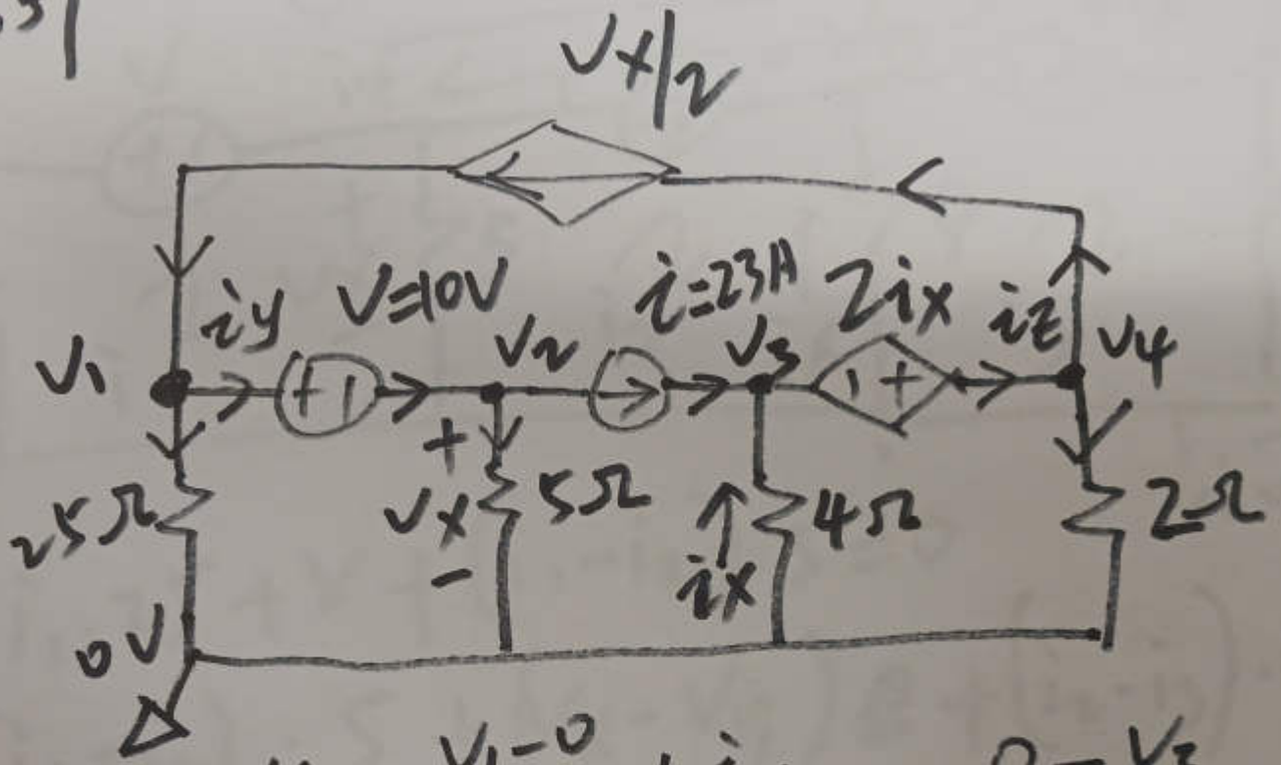
$$\begin{cases} -85 + i_1 \cdot 4 + (i_1 - i_2) \cdot 10 + i_1 \cdot 2 = 0 \\ (i_1 - i_2) \cdot 10 = V_o \\ (i_2 - i_1) \cdot 10 + i_2 \cdot 2.5 - \frac{V_o}{2} + i_2 \cdot 20 = 0 \end{cases}$$



$$\begin{cases} i_1 = 5A \\ i_4 = 1.4A \\ (i_2 - i_1) \cdot 40 + i_2 \cdot 8 + (i_2 - i_3) \cdot 80 = 0 \\ (i_3 - i_2) \cdot 80 + (i_3 - i_4) \cdot 120 = 0 \end{cases}$$

(4)

P4.57



$$\frac{V_x}{2} = \frac{V_1 - 0}{25} + i_y \qquad \frac{0 - V_3}{4} = i_x$$

$$V_1 - V_2 = 10$$

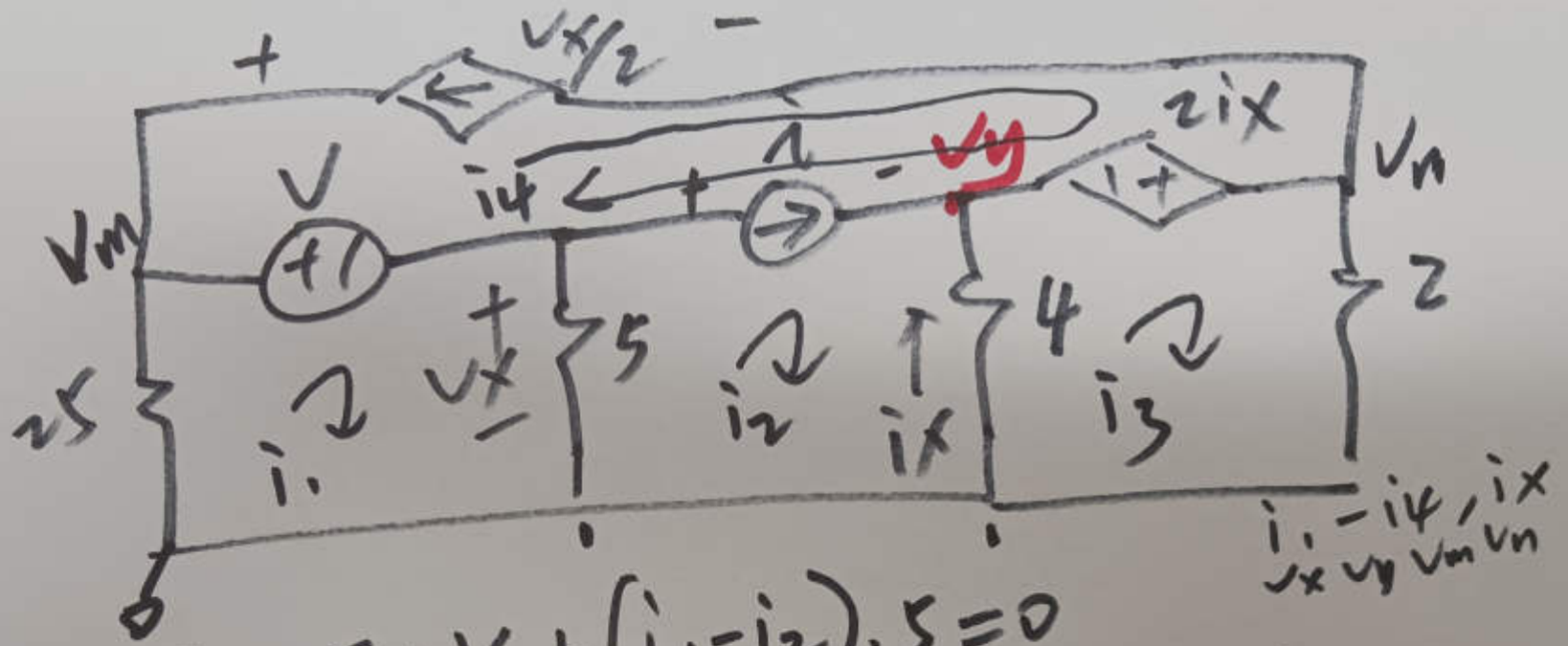
$$i_y = \frac{V_2}{5} + 23$$

$$23 + i_x = i_z$$

$$i_z = \frac{V_4}{2\Omega} + \frac{V_x}{2}$$

$$V_z = V_x$$

(b)



$$i_1 \cdot 25 + V + (i_1 - i_2) \cdot 5 = 0$$

$$(i_2 - i_1) \cdot 5 + (V_x - V_y) + (i_2 - i_3) \cdot 4 = 0$$

$$(i_3 - i_2) \cdot 4 - 2i_x + i_3 \cdot 2 = 0$$

$$V_m - V_n + 2i_x + (V_y - V_x) - V = 0$$

$$V_m = V_x + V \quad , \quad V_n = V_y + 2i_x$$

$$\frac{V_y}{4} = -i_x \quad , \quad \frac{V_x}{2} = -i_4 \quad , \quad (i_1 - i_2) \cdot 5 = V_x$$

(5)