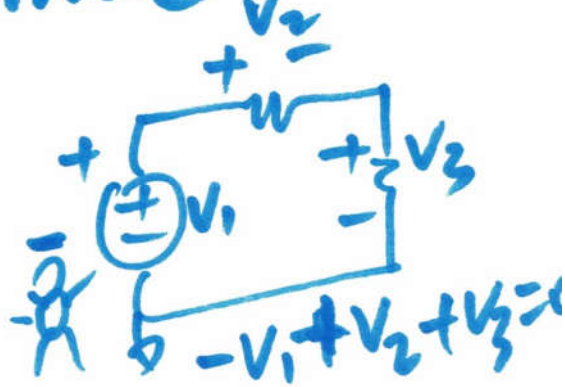
# Important & Useful

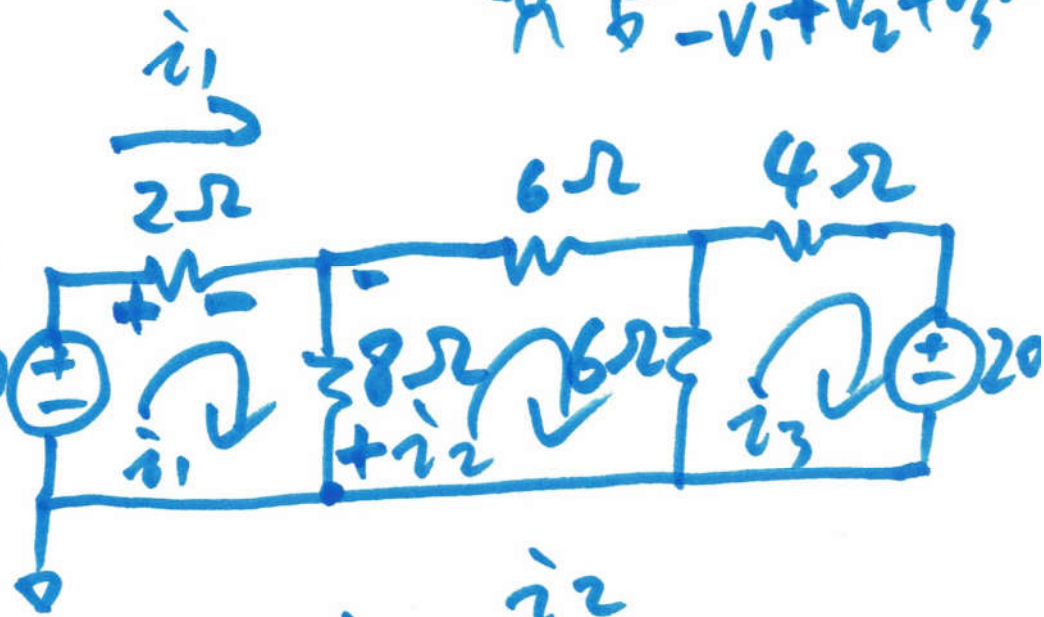
# The Mesh Current Method

① Draw the mesh current

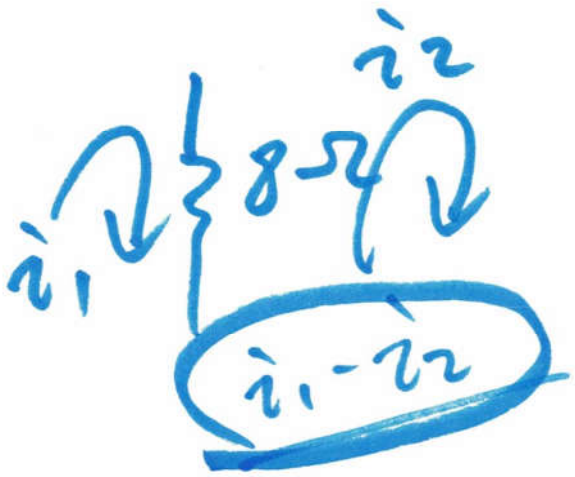
② KVL

③ solve it




$$\begin{cases} -40+i_1\cdot 2+(i_1-i_2)\cdot 8=0 \\ (i_2-i_1)\cdot 8+i_2\cdot 6 \\ +(i_2-i_3)\cdot 6=0 \\ (i_3-i_2)\cdot 6+i_3\cdot 4+20=0 \end{cases}$$



$$\begin{cases} 10i_1 - 8i_2 + 0i_3 = 40 \\ -8i_1 + 20i_2 - 6i_3 = 0 \\ 0i_1 - 6i_2 + 10i_3 = -20 \end{cases}$$

$$A = \begin{bmatrix} 10 & -8 & 0 \\ -8 & 20 & -6 \\ 0 & -6 & 10 \end{bmatrix}$$

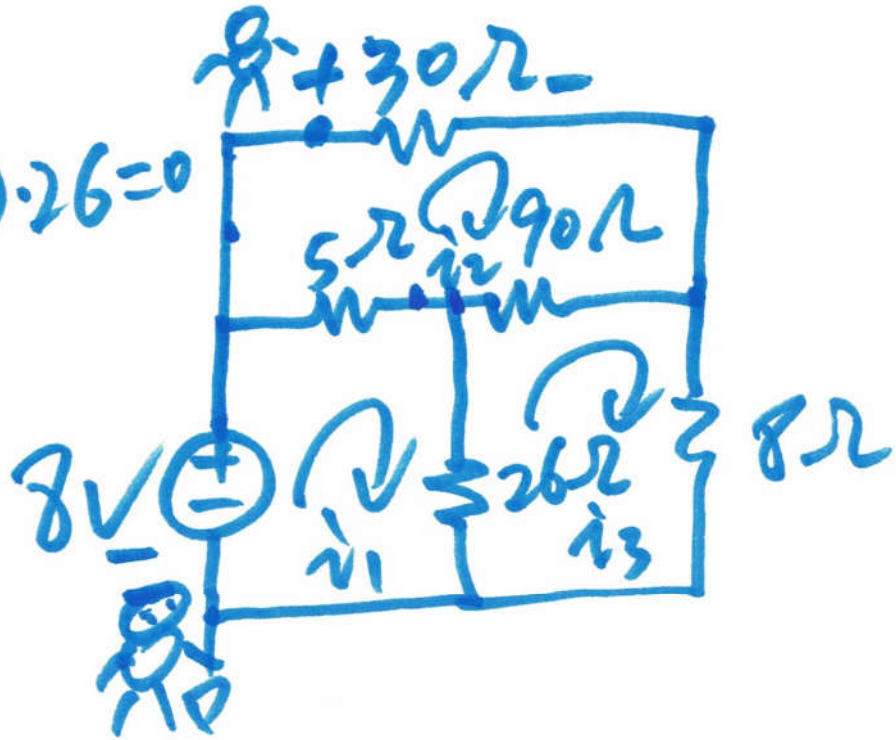
$$Ax \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = \begin{bmatrix} 40 \\ 0 \\ -20 \end{bmatrix} = b$$

$$\begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = A^{-1} \cdot b$$

$$Ax = b$$

$$x = A^{-1} \cdot b$$

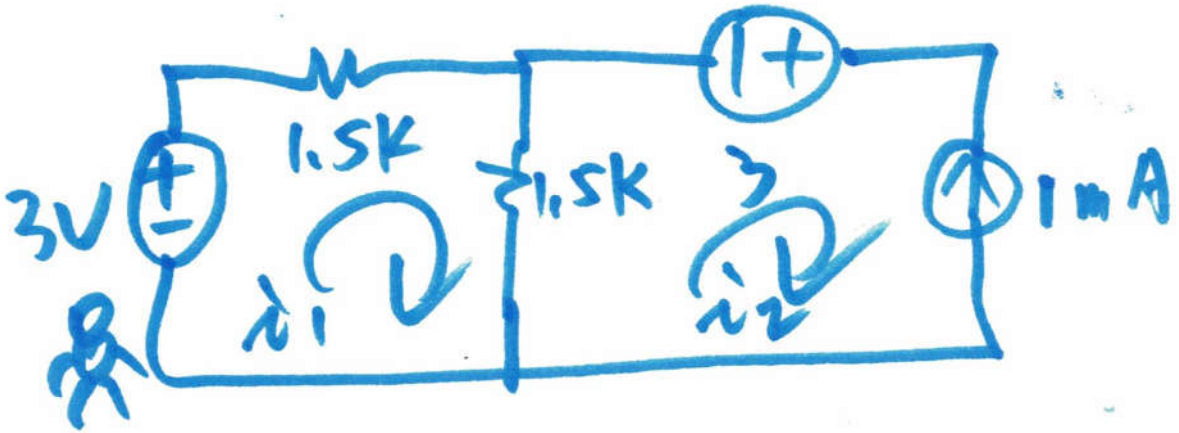
(2)



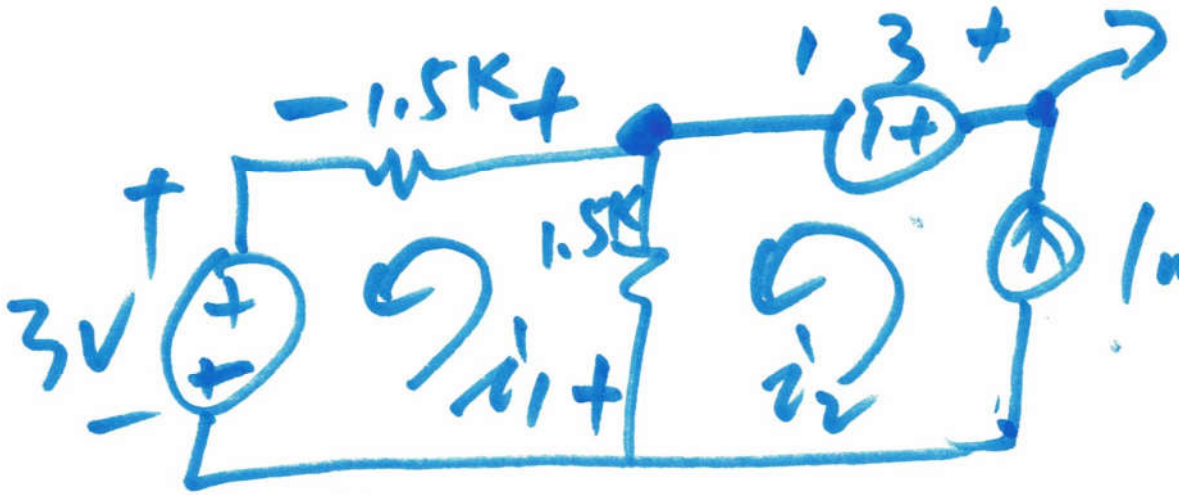

$$\begin{cases} -8+(i_1-i_2)\cdot 5+(i_1-i_3)\cdot 26=0 \\ i_2\cdot 30+(i_2-i_3)\cdot 90 \\ +(i_2-i_1)\cdot 5=0 \\ (i_3-i_2)\cdot 90+i_3\cdot 8 \\ +(i_3-i_1)\cdot 26=0 \end{cases}$$

$$\begin{cases} 31i_1-5i_2-26i_3=8 \\ -5i_1+125i_2-90i_3=0 \\ -26i_1-90i_2+124i_3=0 \end{cases}$$

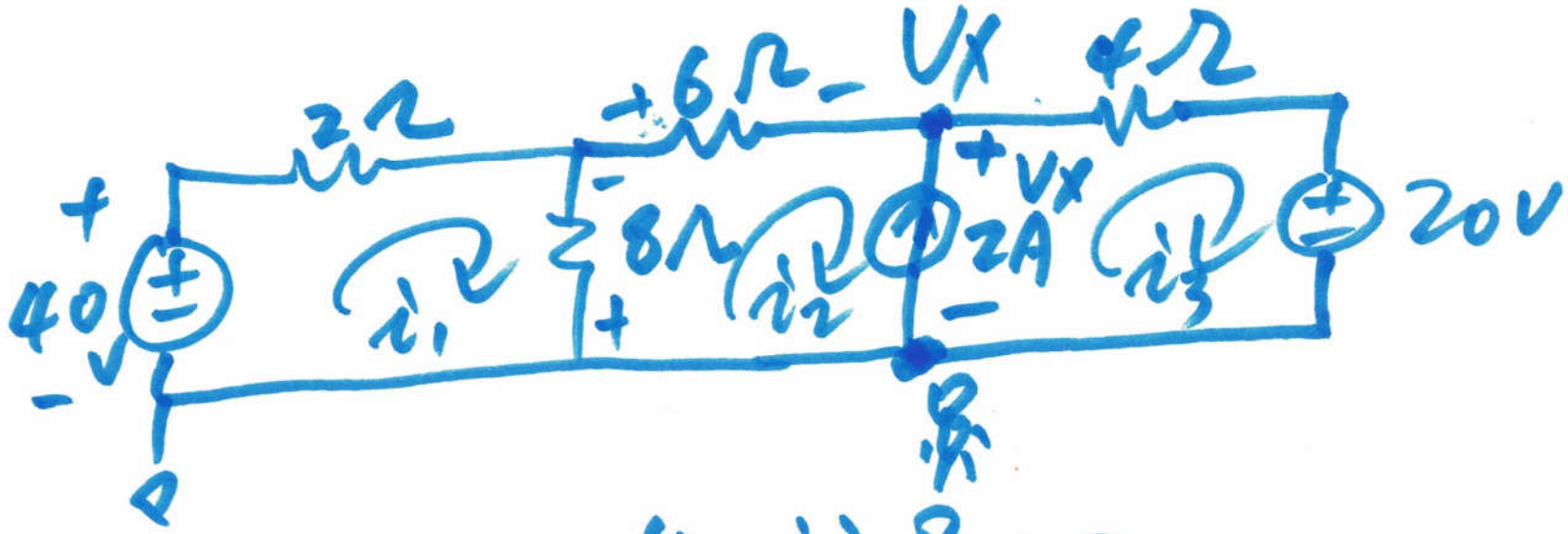
(3)




$$\begin{cases} -3 + i_1 \cdot 1.5K + (i_1 - i_2) \cdot 1.5K = 0 \\ i_2 = -1mA \end{cases}$$



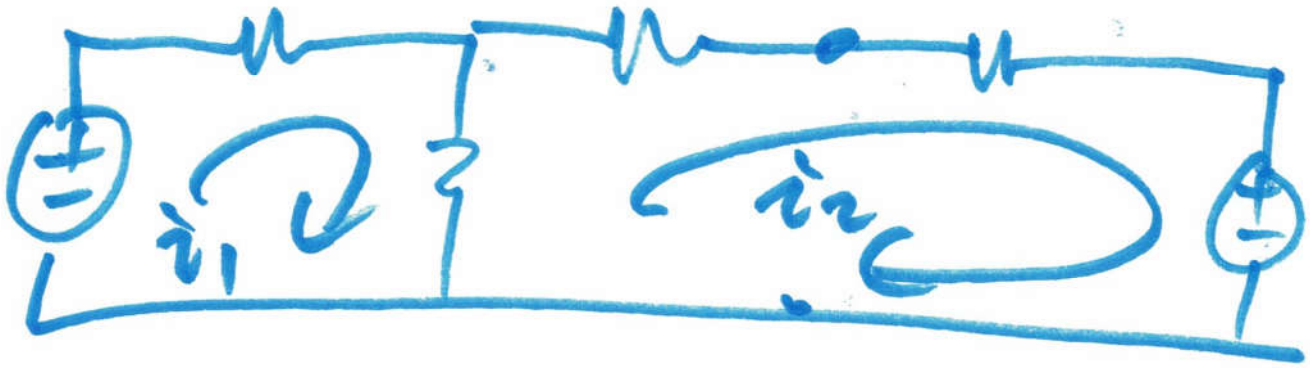

$$\begin{cases} (i_1 - i_2) \cdot 1.5K + i_1 \cdot 1.5K + 3V = 0 \\ i_2 = 1mA \end{cases}$$




$$\begin{cases} -40 + i_1 \cdot 2 + (i_1 - i_2) \cdot 8 = 0 \\ (i_2 - i_1) \cdot 8 + i_2 \cdot 6 + V_x = 0 \\ -V_x + i_3 \cdot 4 + 20 = 0 \end{cases}$$

$$(i_2 - i_1) \cdot 8 + i_2 \cdot 6 + i_3 \cdot 4 + 20 = 0$$

super-mesh method


$i_1$
$i_2$