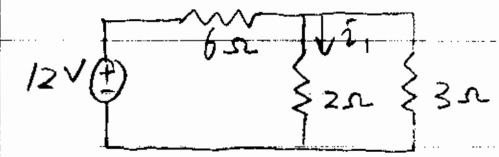
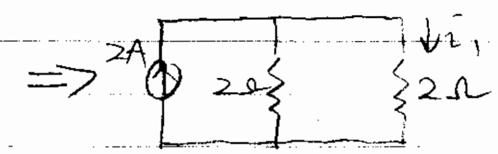
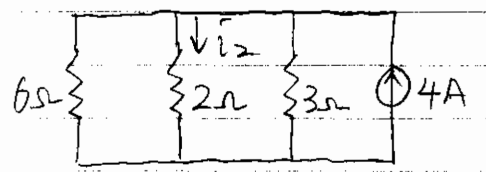
HW #4

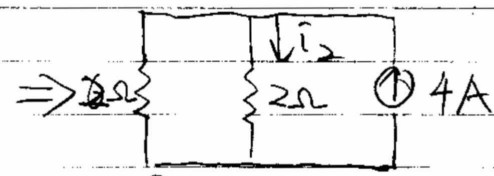
4.11





$i_1 = 1A$

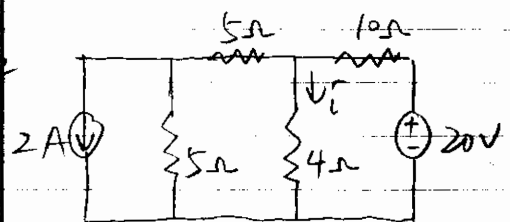


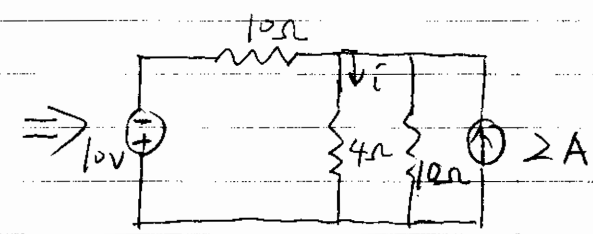


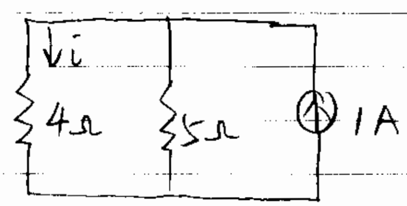
$i_2 = 2A$

$$\boxed{i = i_1 + i_2 = 3A}$$

4.22

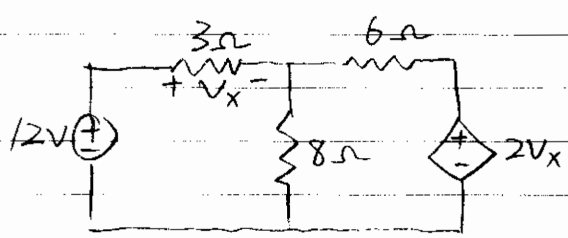


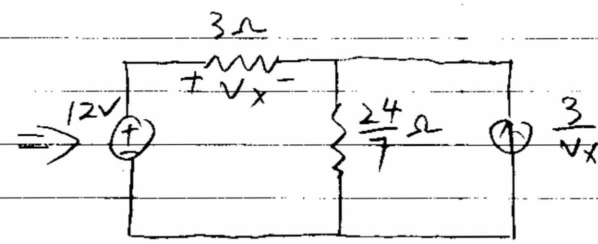


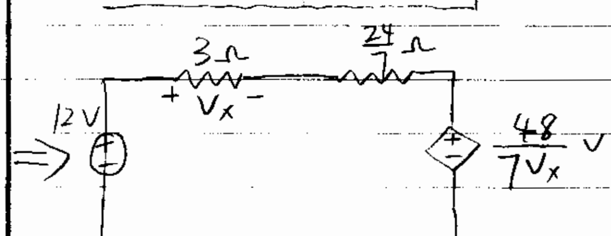


$$\boxed{i = \frac{5}{9} \times 1 = 0.555\,A}$$

4.31



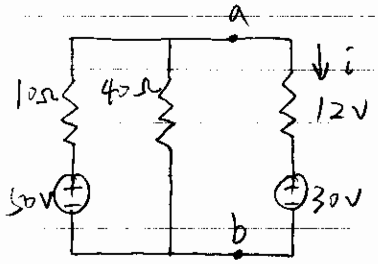




$$\begin{cases} 3i + \frac{24}{7} i = 12 - \frac{48}{7V_x} \\ V_x = 3i \end{cases}$$

$\Rightarrow V_x = 3.652\ V$

4.36

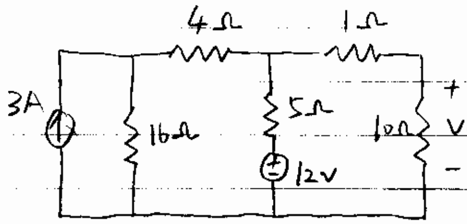


$R_{th} = 10\Omega \,//\, 40\Omega = 8\Omega$

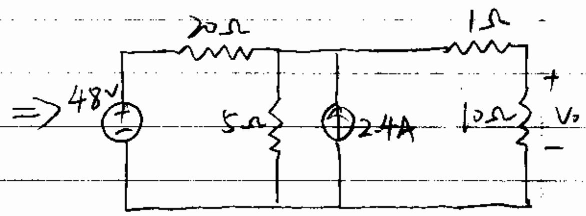
$V_{th} = 40V$

$$i = \frac{40-30}{12+8} = 0.5\,A$$

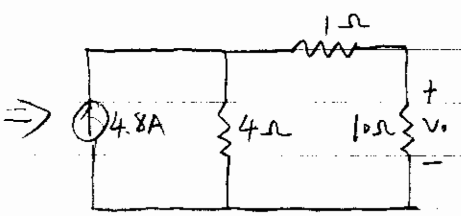
4.38



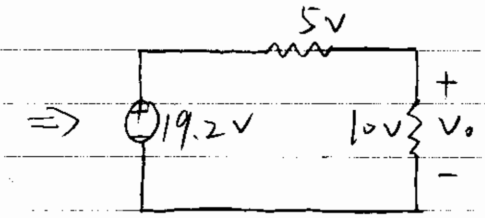
⇒



⇒

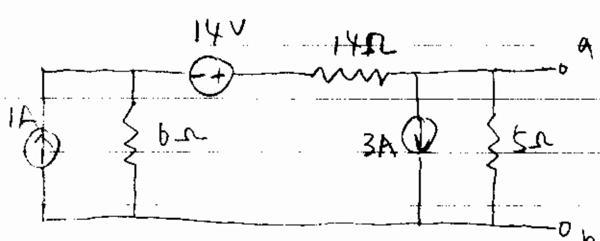


⇒

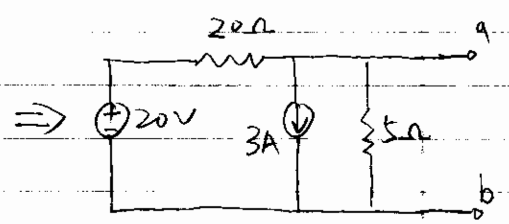


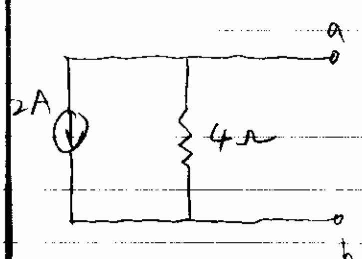
$$V_0 = \frac{10}{10+5} \times 19.2 = 12.8\,V$$

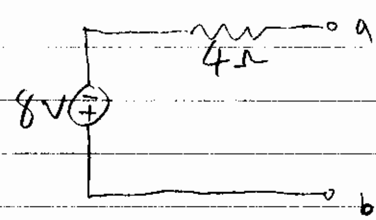
4.41



⇒



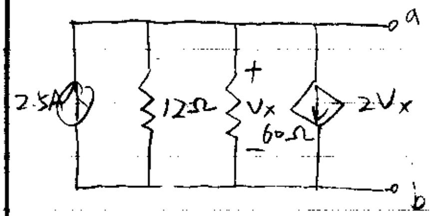




Norton Thevenin

$I_N = -2A$, $R_{th} = 4\Omega$, $V_{th} = -8V$

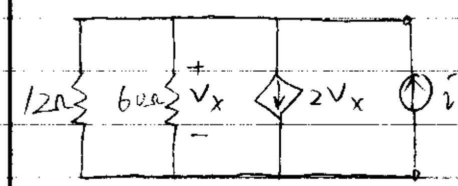
4.47



$$(2.5 - 2V_x) \cdot (12 \,//\, 60) = V_x$$

$$V_x = 1.19\ \text{V}$$

$$\underline{V_{th} = V_x = 1.19\ \text{V}}$$

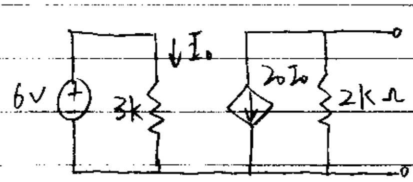


$$\frac{V_x}{12} + \frac{V_x}{60} + 2V_x = i$$

$$126 V_x = 60 i$$

$$\underline{i = 2.5\text{A}}, \quad \underline{R_{th} = \frac{V_x}{i} = 0.476\,\Omega}$$

4.52



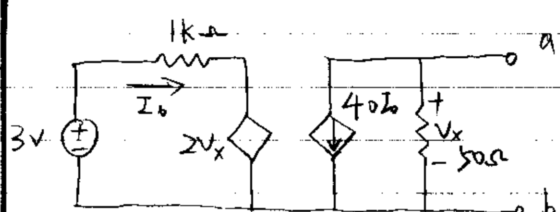
$$I_o = \frac{6}{3k} = 2\text{mA}$$

$$\underline{R_{th} = 2k\,\Omega}$$

$$V_{th} = -20 I_o \cdot 2k = -20 \times 2m \times 2k$$

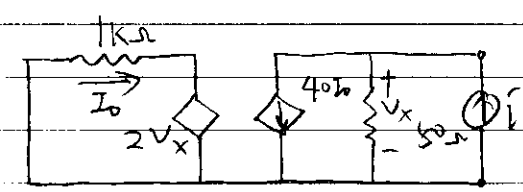
$$\underline{= -80\ \text{V}}$$

4.54



$$\begin{cases} 3 - 2V_x = 1000 I_o \\ V_x = -50\,(40 I_o) \end{cases}$$

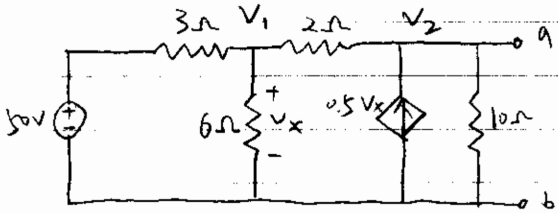
$$\Rightarrow \underline{V_{th} = V_x = 2\text{V}}$$



$$\begin{cases} -2V_x = 1000 I_o \\ \frac{V_x}{50} + i = 40 I_o \end{cases}$$

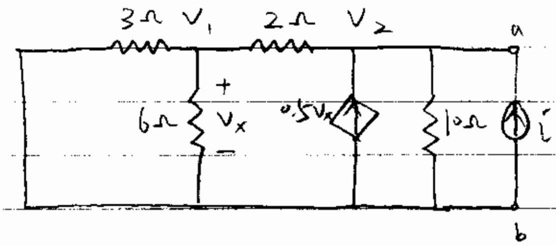
$$\Rightarrow \underline{R_{th} = \frac{V_x}{i} = -16.67\,\Omega}$$

4.57



$$\begin{cases} \dfrac{V_1-50}{3}+\dfrac{V_1}{6}+\dfrac{V_1-V_2}{2}=0 \\ \dfrac{V_2-V_1}{2}+\dfrac{V_2}{10}-\dfrac{V_1}{2}=0 \end{cases}$$

$$\Rightarrow \underline{V_{th}=V_2=166.67\ V}$$

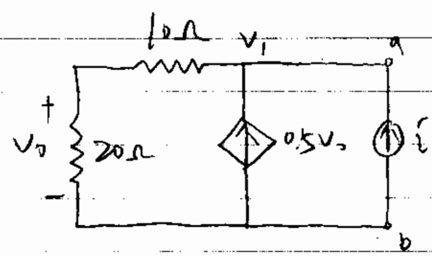


$$\begin{cases} \dfrac{V_1}{3}+\dfrac{V_1}{6}+\dfrac{V_1-V_2}{2}=0 \\ \dfrac{V_2-V_1}{2}+\dfrac{V_2}{10}-\dfrac{V_1}{2}-i=0 \end{cases}$$

$$\Rightarrow \underline{i=16.67\,A}$$

$$R_{th}=\frac{V_{th}}{i}=\frac{166.67}{16.67}=10\,\Omega$$

4.63



$$\begin{cases} \dfrac{V_1}{30}-0.5V_o-i=0 \\ V_o=\dfrac{2}{3}V_1 \end{cases}$$

$$R_{th}=\frac{V_1}{i}=-3.33\,\Omega$$

No independent voltage source or current source,

$V_{th}=0$, $I_N=0$