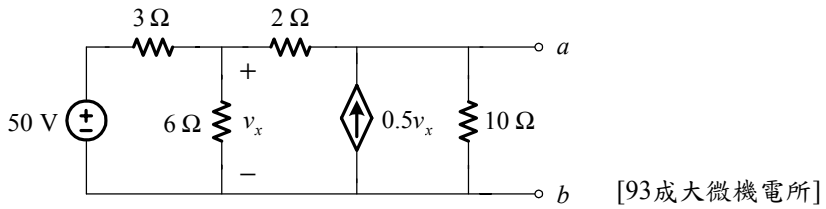


1-1 電路分析技巧

等效電路

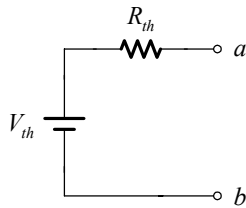
範例 1

試求出下圖 $a$ - $b$ 兩點之戴維寧及諾頓等效電路。

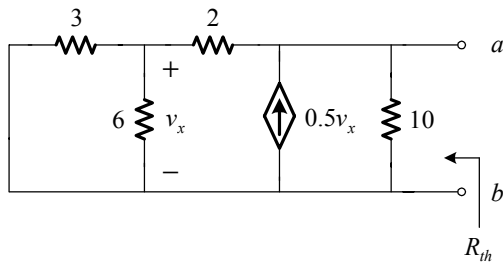


【解析】

(1) 戴維寧等效

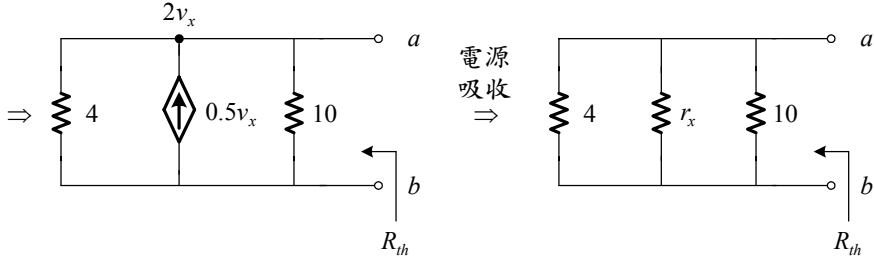


$R_{th}$  之求法為令獨立電源為零，由 $a, b$ 端看入之等效電阻，如下圖所示。



1-4 電子學經典題型解析 (I)

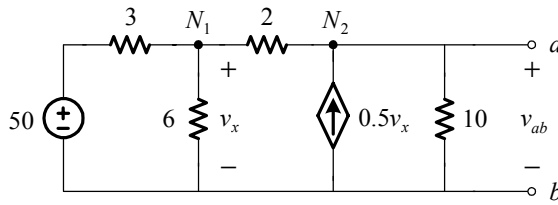
可進一步等效為



利用電源吸收原理可得

$$r_x = \frac{2v_x}{-0.5v_x} = -4 (\Omega) \Rightarrow R_{th} = 4 // r_x // 10 = 10 (\Omega)$$

$V_{th}$  為  $a, b$  端之開路電壓，如下圖所示。



由節點方程式

$$N_1 : v_x \left( \frac{1}{3} + \frac{1}{6} + \frac{1}{2} \right) = \frac{50}{3} + \frac{v_{ab}}{2}$$

$$N_2 : v_{ab} \left( \frac{1}{10} + \frac{1}{2} \right) = \frac{v_x}{2} + 0.5v_x$$

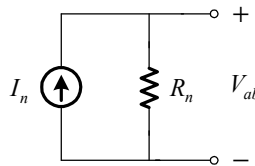
聯立可得

$$v_{ab} = \frac{500}{3} (\text{V})$$

(2) 諾頓等效

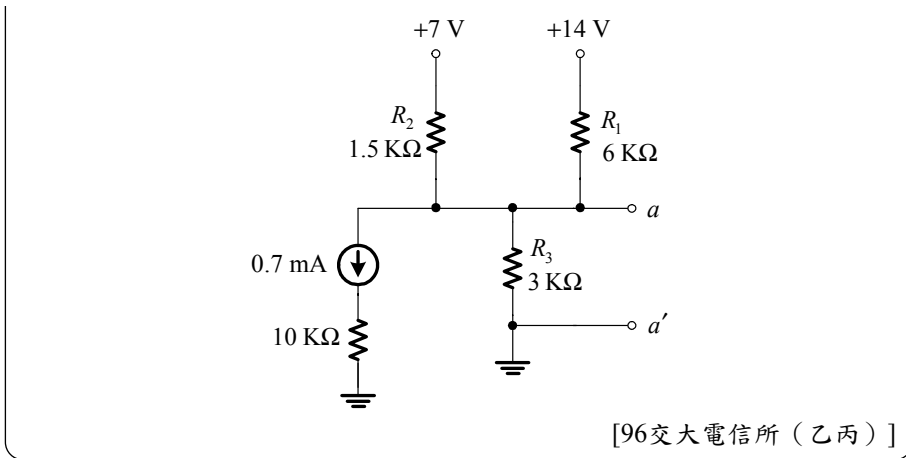
$$R_n = R_{th} = 10 (\Omega)$$

$$I_n = \frac{V_{th}}{R_{th}} = \frac{50}{3} (\text{A})$$



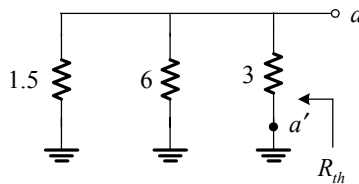
範例 2

Find the Thevenin's equivalent circuit for the circuit in the Fig. How is the "equivalence" established? (No point is given if only translation.)



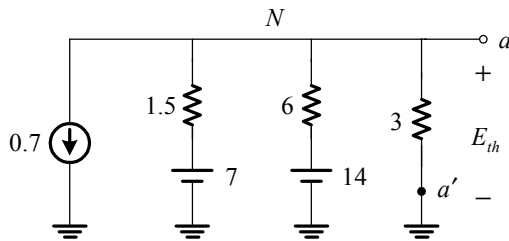
【解析】

$R_{th}$  : 令獨立電源為零，由  $a, a'$  端看入之等效電阻，如下圖所示：



$$R_{th} = 1.5 // 3 // 6 = 0.857 \text{ (K}\Omega\text{)}$$

$E_{th}$  : 為  $a, a'$  端之開路電壓，如下圖所示：



由  $N$  可得

$$E_{th} = \left[ \left( \frac{7}{1.5} + \frac{14}{6} \right) - 0.7 \right] (1.5 // 3 // 6) = 5.3991 \text{ (V)}$$

故戴維寧等效電路如下：

