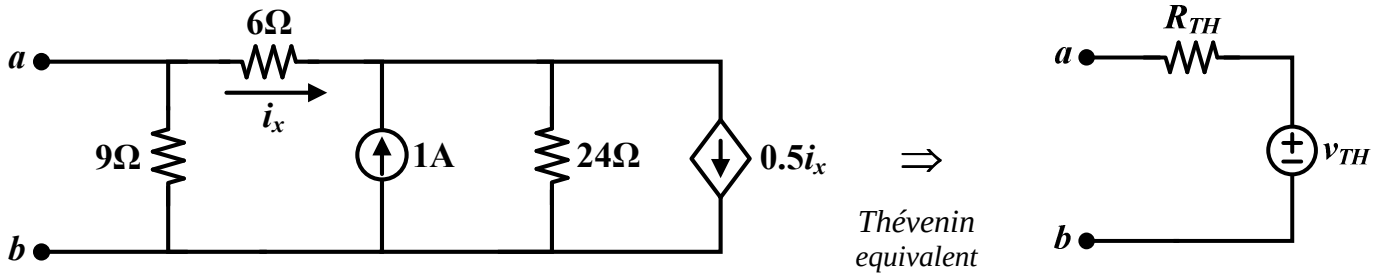
電路學(EE2210)第五次隨堂考

2013年10月23日
時間：10 分鐘
Close Book

學號：_____

姓名：_____

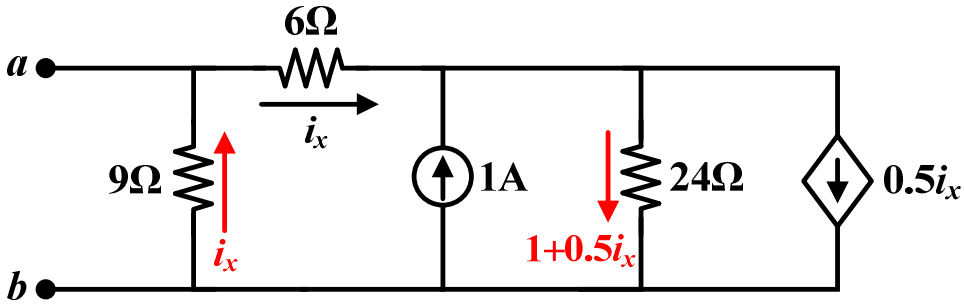
Find the Thévenin equivalent paramaters, v_{TH} and R_{TH}, for the port *ab* of the network shown in the following figure.



Solution:

(i) v_{TH}

The v_{TH} can be found by determining the open-circuit voltage across port *ab*.



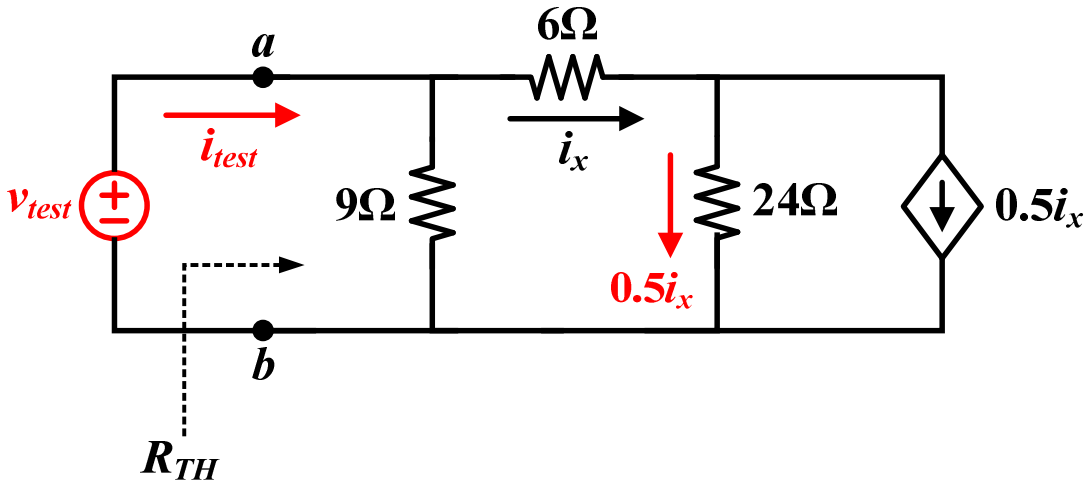
$$\begin{cases} v_{TH} = v_{ab} = \left[(1+0.5i_x)\times 24\right] + (i_x \times 6) = 24 + 18i_x \\ v_{TH} = v_{ab} = -9i_x \end{cases}$$

$$\Rightarrow i_x = -\frac{24}{27} = -\frac{8}{9}\text{A}$$

$$\Rightarrow v_{TH} = -9i_x = (-9)\times\left(-\frac{8}{9}\right) = 8\text{V}$$

(ii) R_{TH}

With the independent current source set to zero, we can find the R_{TH} by forcing a testing current i_{test} into terminal *a* and caculate the voltage v_{test} across *ab*.



$$v_{test} = (0.5i_x \times 24) + (i_x \times 6) = 18i_x \quad \Rightarrow \quad i_x = \frac{v_{test}}{18}$$

$$v_{test} = (i_{test} - i_x) \times 9 = (i_{test} \times 9) - \left(\frac{v_{test}}{18} \times 9\right) \quad \Rightarrow \quad \left(1 + \frac{9}{18}\right) v_{test} = i_{test} \times 9$$

$$R_{TH} = \frac{v_{test}}{i_{test}} = \frac{\frac{2}{3} i_{test} \times 9}{i_{test}} = 6\Omega$$

v_{TH} = 8V, R_{TH} = 6Ω.