ECE 2100
Circuit Analysis

Lesson 14
Chapter 4: Circuit Theorems
Thevenin's Theorem

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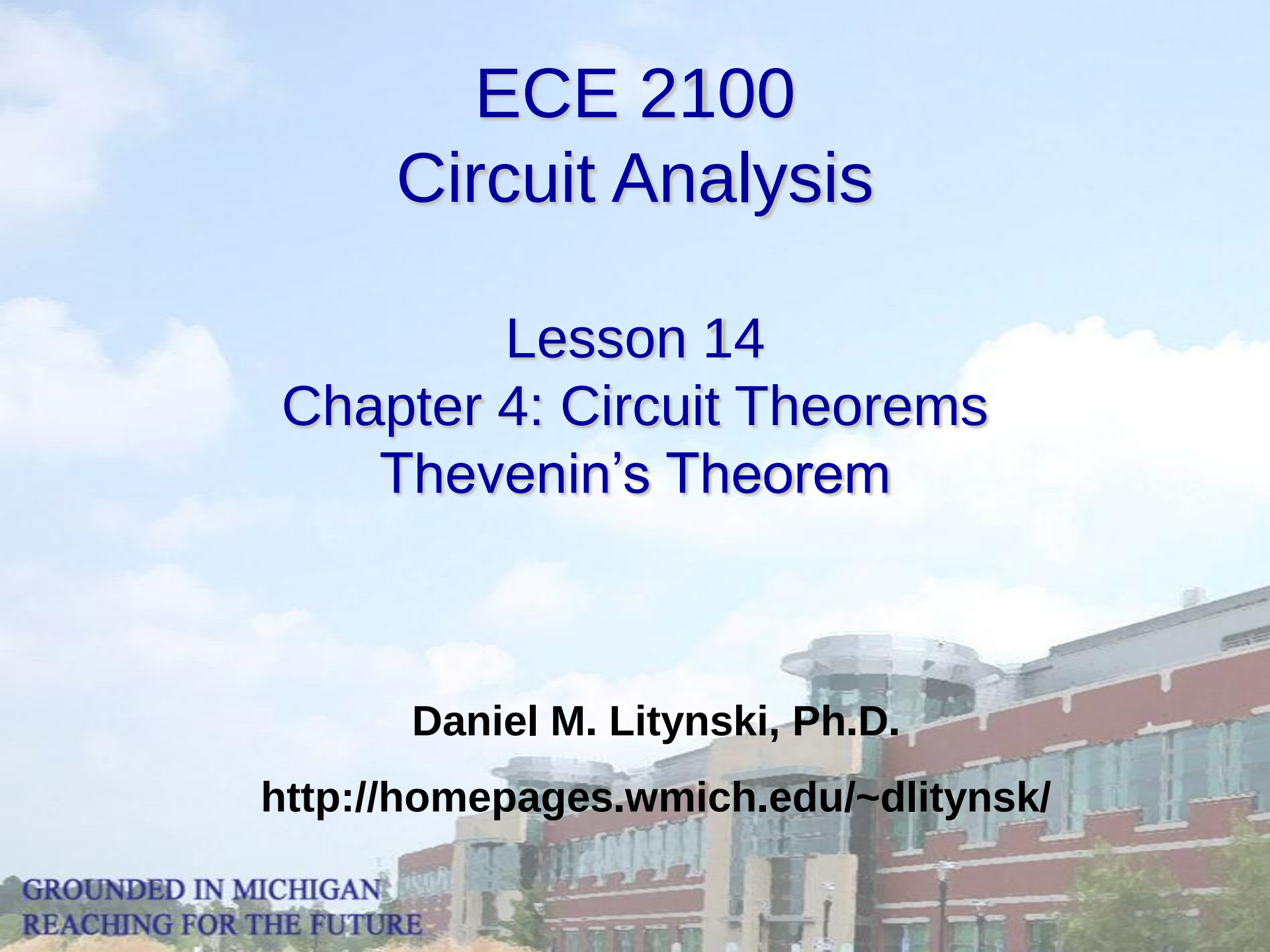

Circuit Theorems - Chapter 4

4.1 Motivation
4.2 Linearity Property
4.3 Superposition
4.4 Source Transformation
4.5 Thevenin's Theorem
4.6 Norton's Theorem
4.7 Maximum Power Transfer

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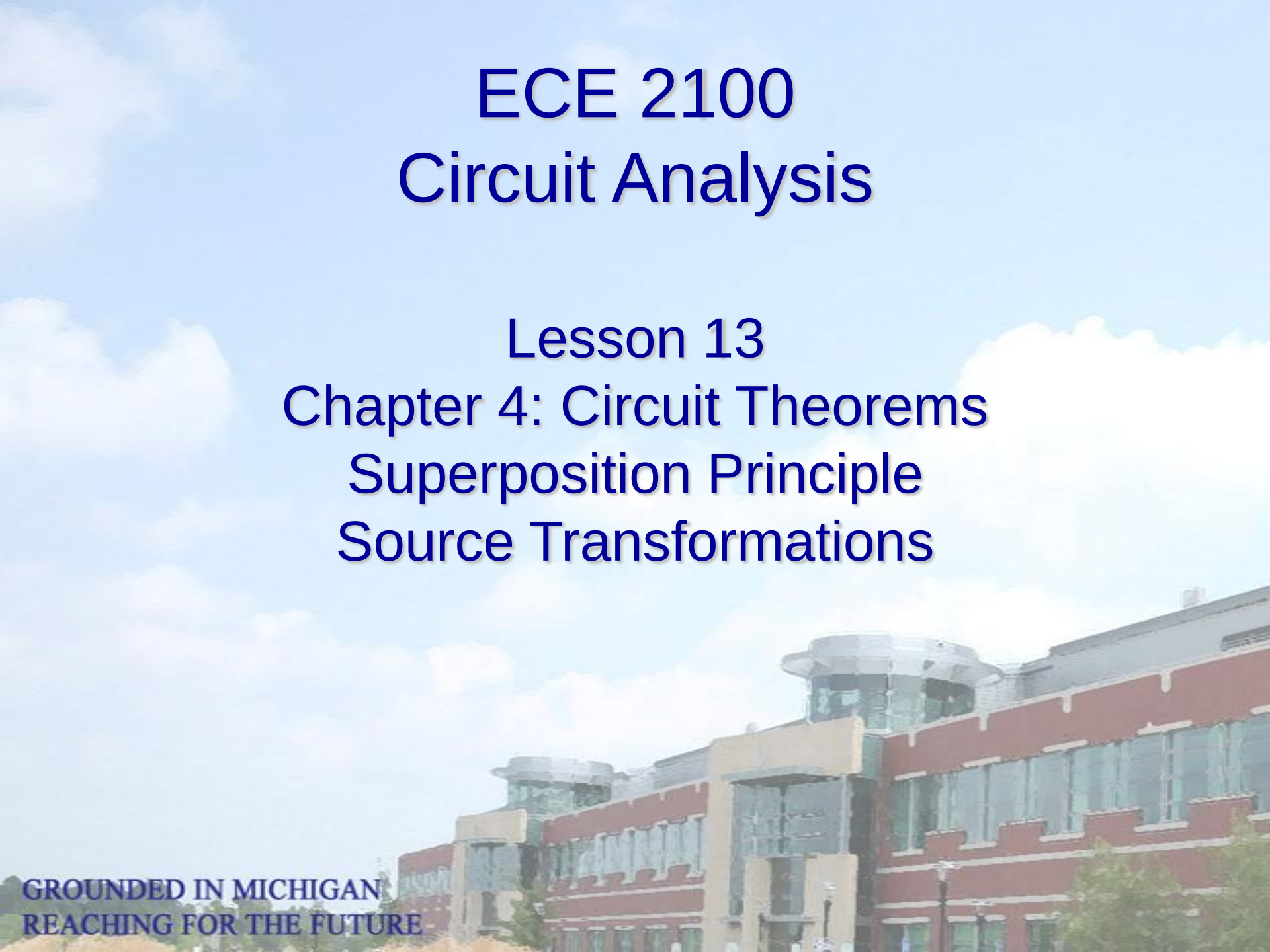
Circuit Analysis

Lesson 13
Chapter 4: Circuit Theorems
Superposition Principle
Source Transformations



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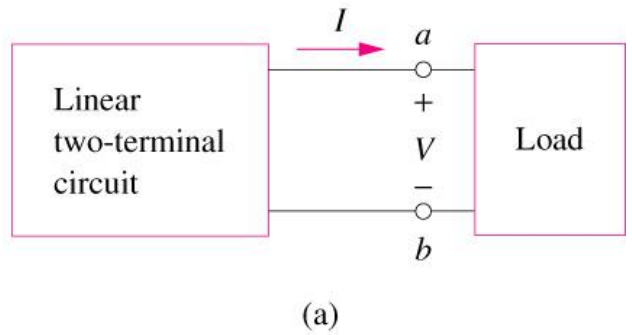
4.5 Thevenin's Theorem (1)

It states that a linear two-terminal circuit (Fig. a) can be replaced by an equivalent circuit (Fig. b) consisting of a voltage source V_{TH} in series with a resistor R_{TH},

where

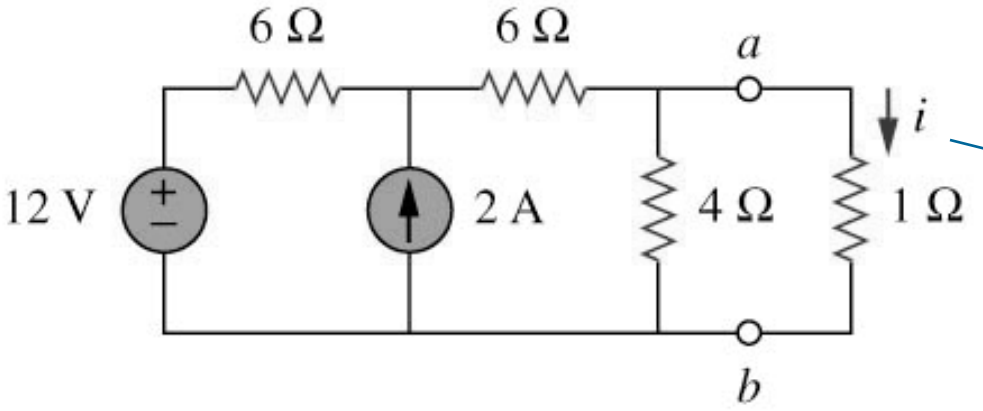


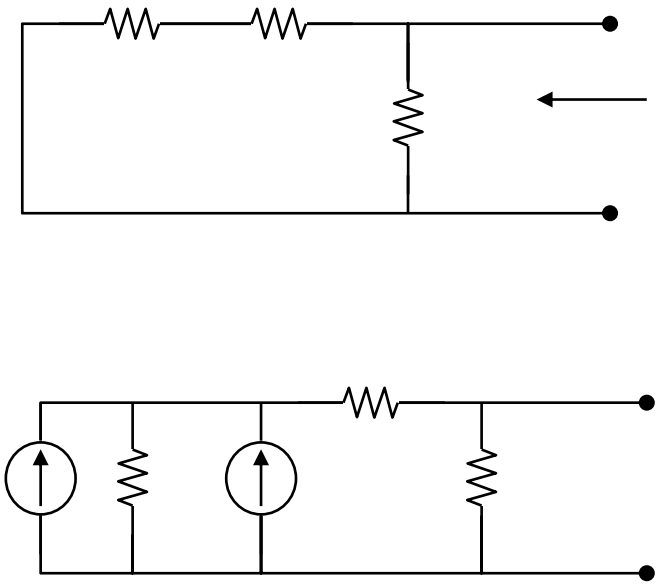
- V_{TH} is the open-circuit voltage at the terminals.
- R_{TH} is the input or equivalent resistance at the terminals when the independent sources are turned off.

4.5 Thevenin's Theorem (2)

Example 5

Using Thevenin's theorem, find the equivalent circuit to the left of the terminals in the circuit shown below. Hence find i.



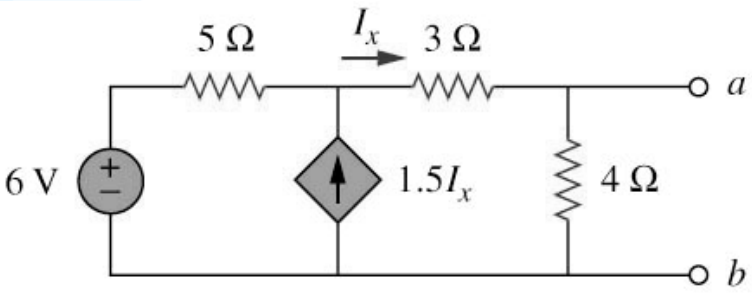


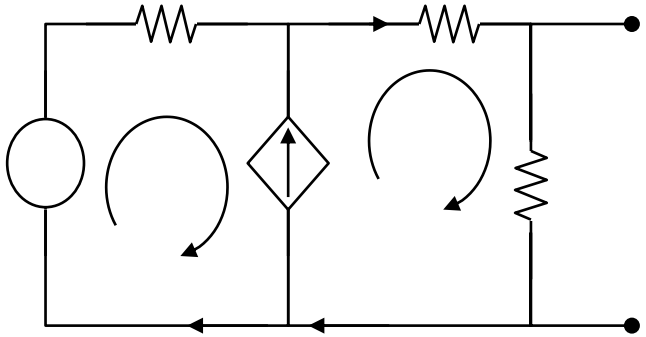
*Refer to in-class illustration, textbook, answer V_{TH} = 6V, R_{TH} = 3Ω, i = 1.5A

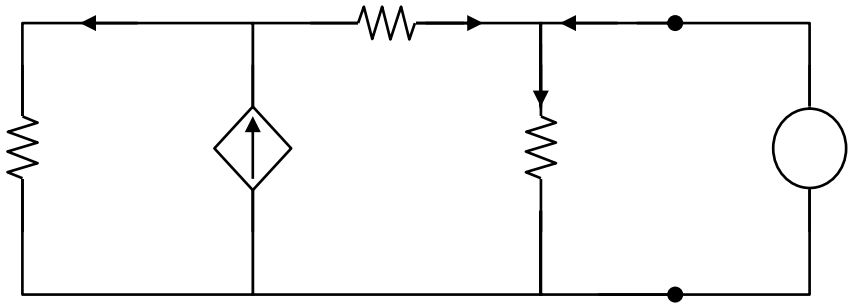
4.5 Thevenin's Theorem (3)

Example 6

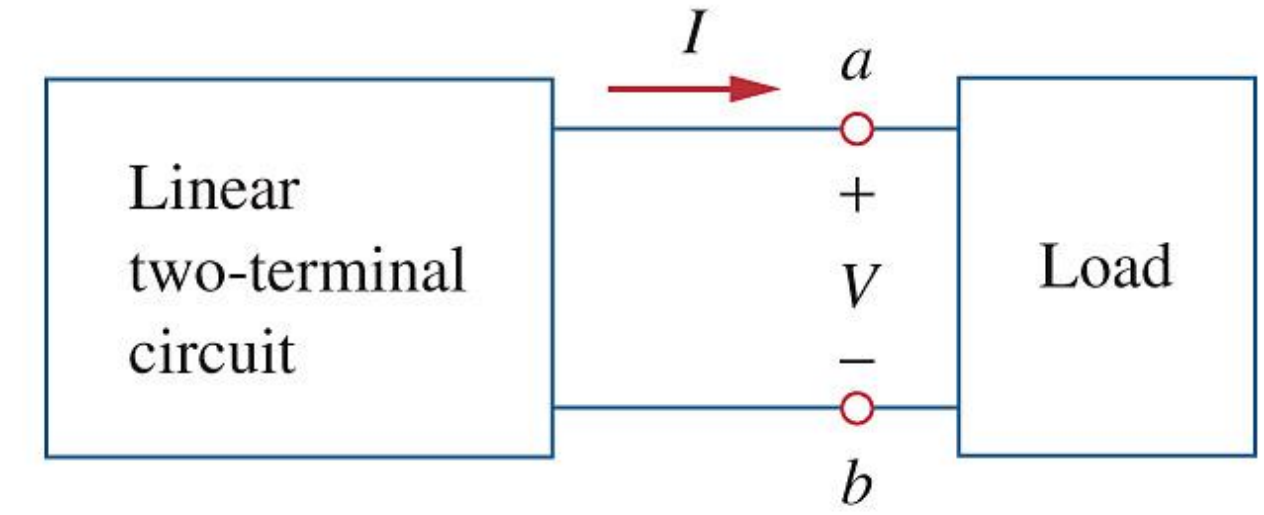
Find the Thevenin equivalent circuit of the circuit shown below to the left of the terminals.



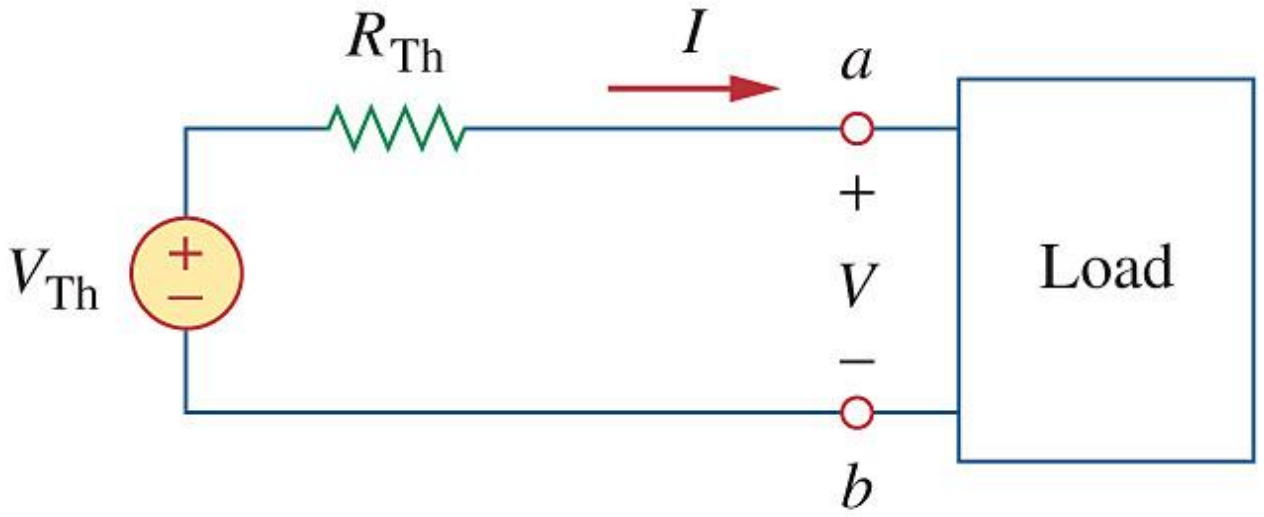




*Refer to in-class illustration, textbook, answer V_{TH} = 5.33V, R_{TH} = 3Ω



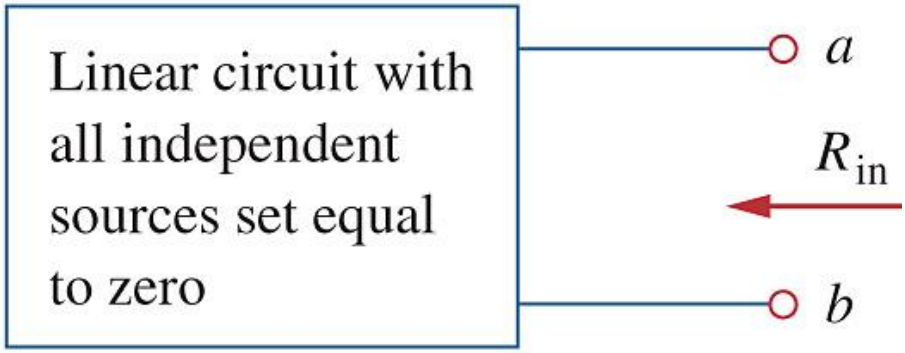
(a)



(b)

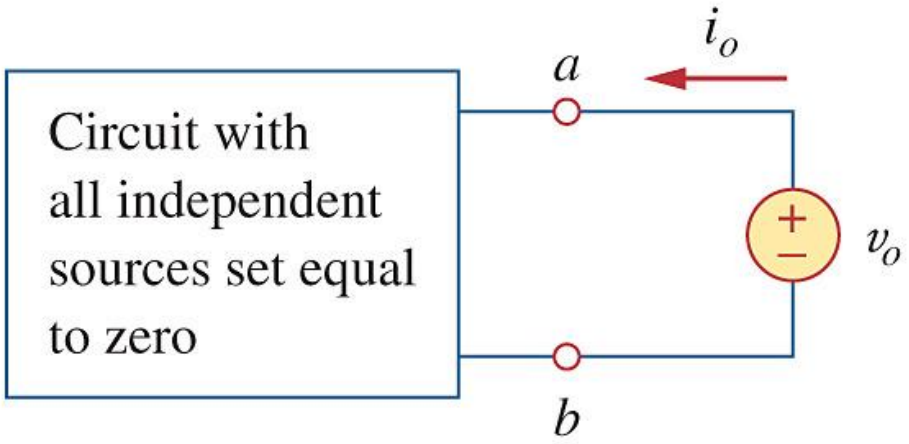
$V_{\text{Th}} = v_{oc}$

(a)



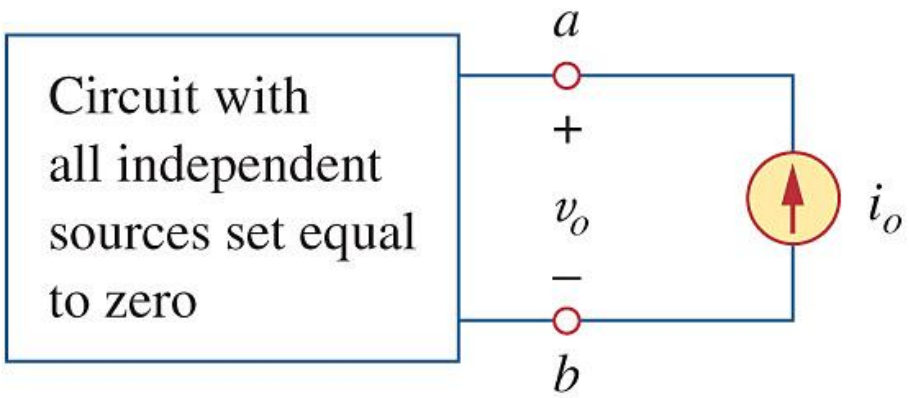
$R_{\text{Th}} = R_{\text{in}}$

(b)



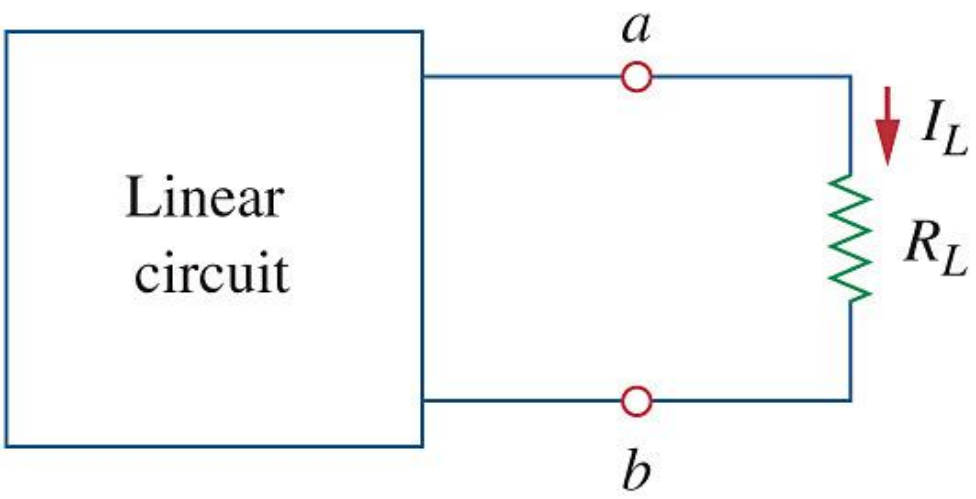
$$R_{\text{Th}} = \frac{v_o}{i_o}$$

(a)

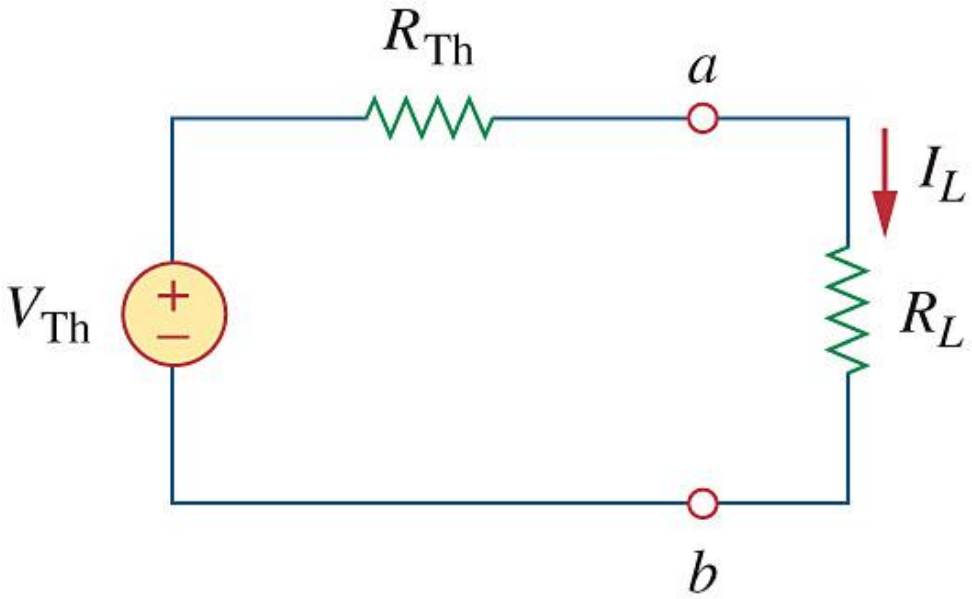


$$R_{\text{Th}} = \frac{v_o}{i_o}$$

(b)



(a)



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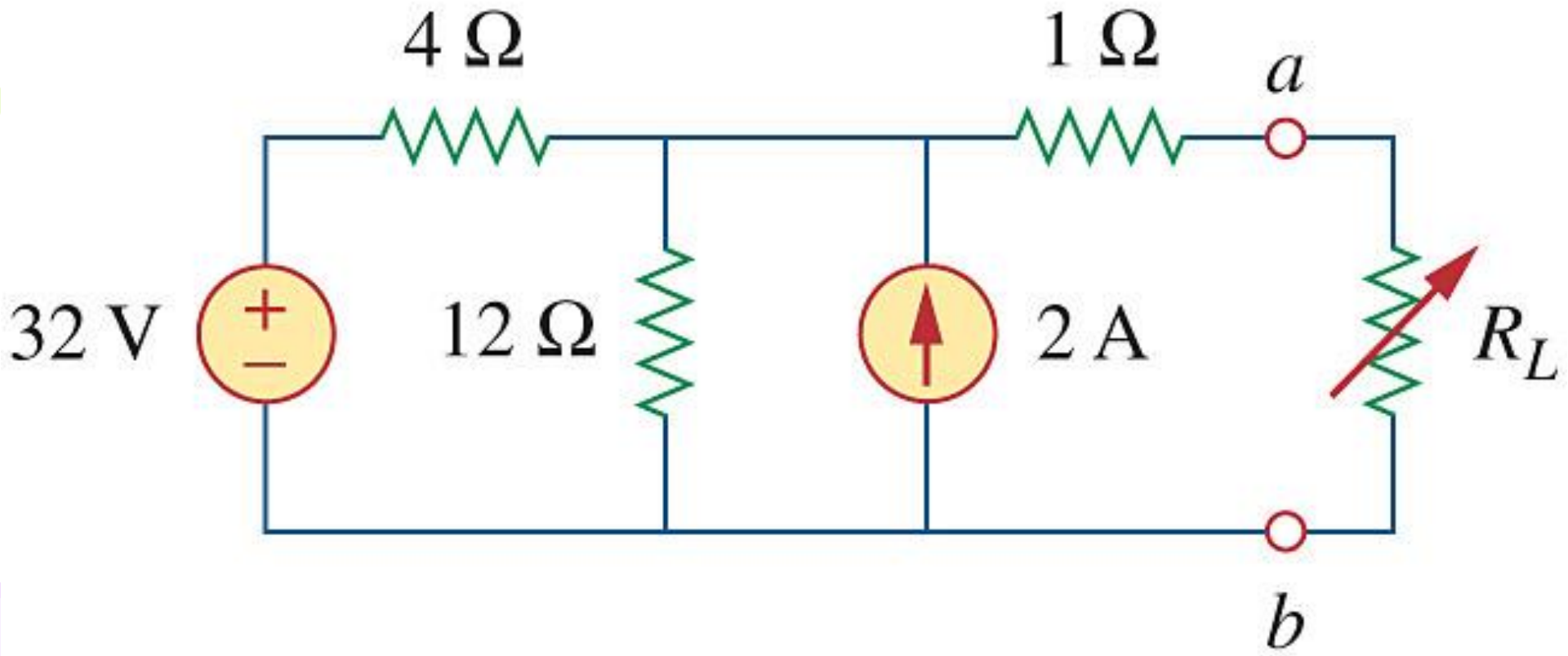
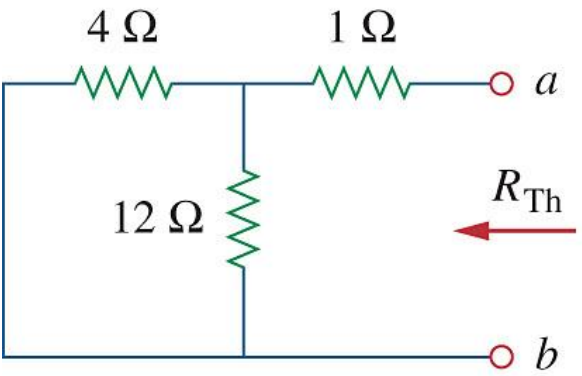
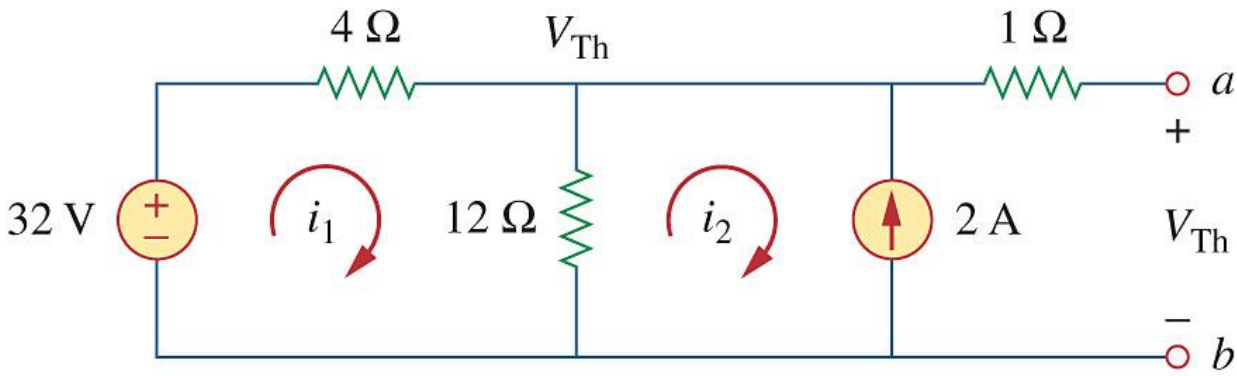
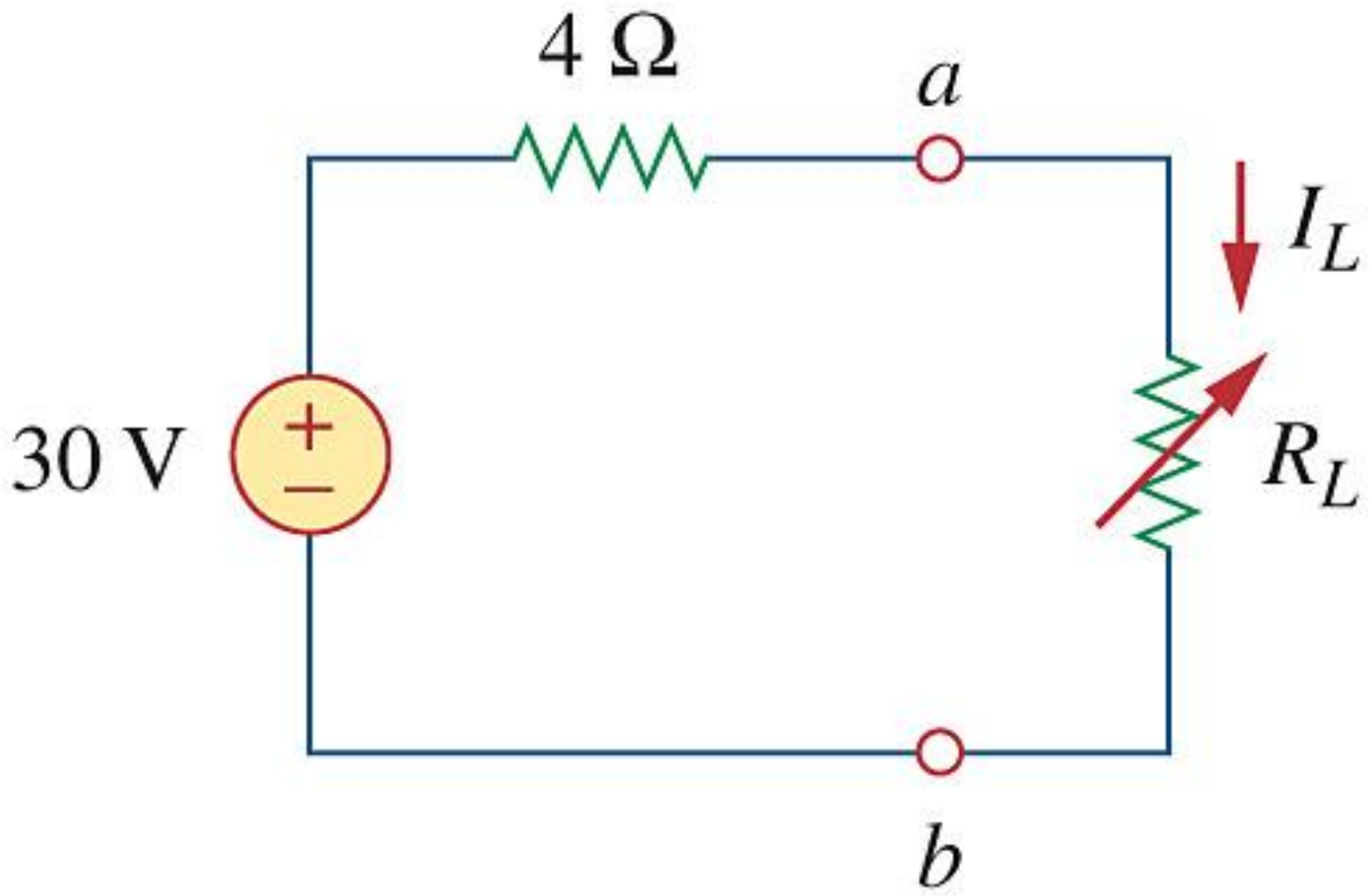


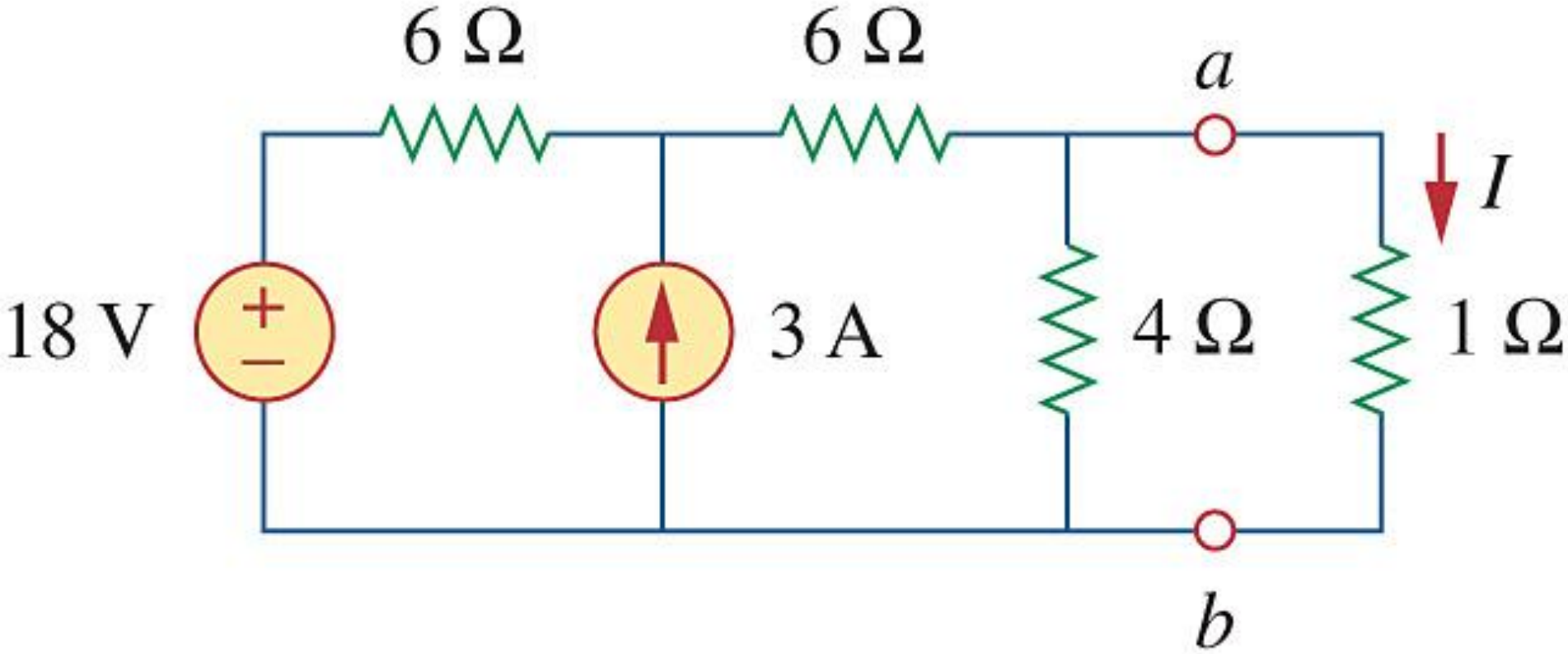


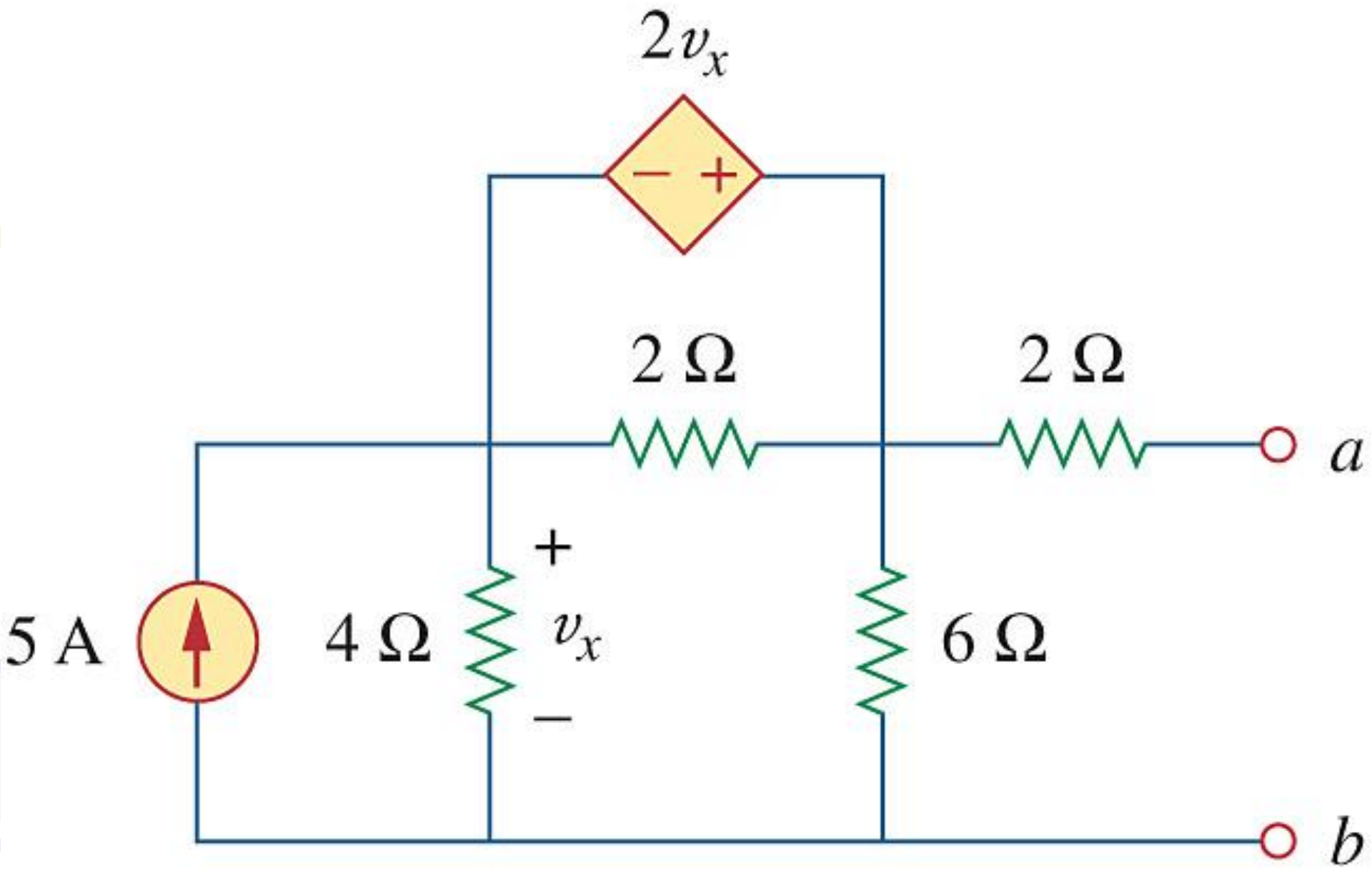
(a)

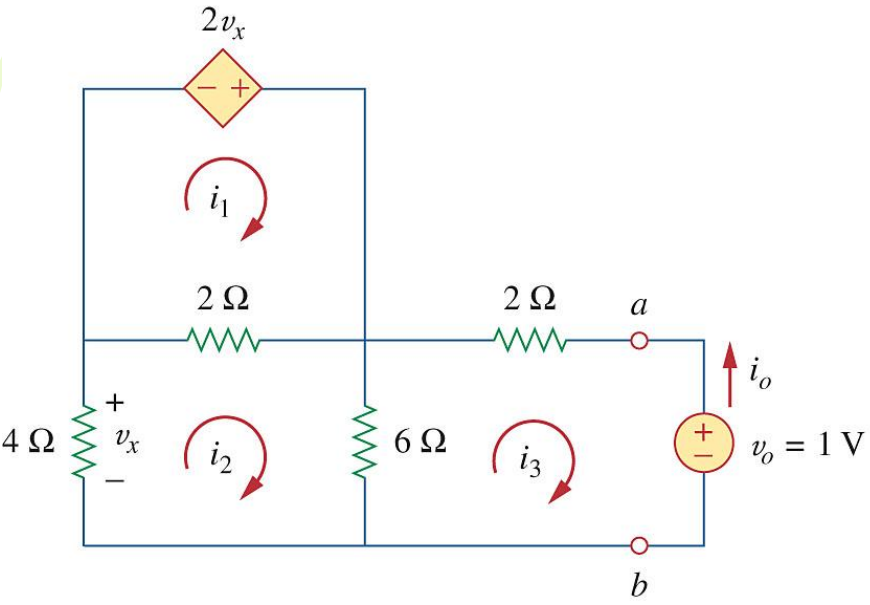


(b)

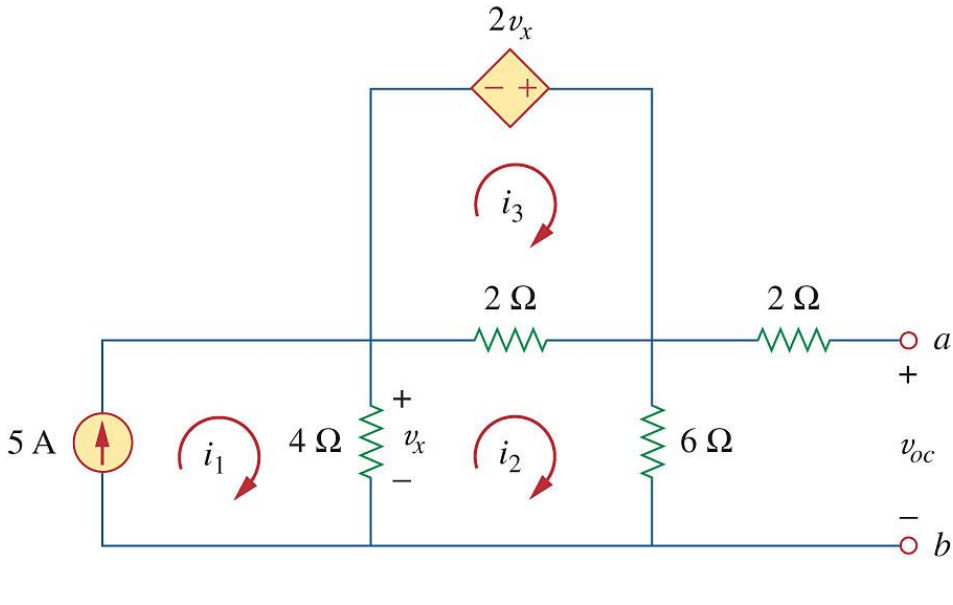








(a)



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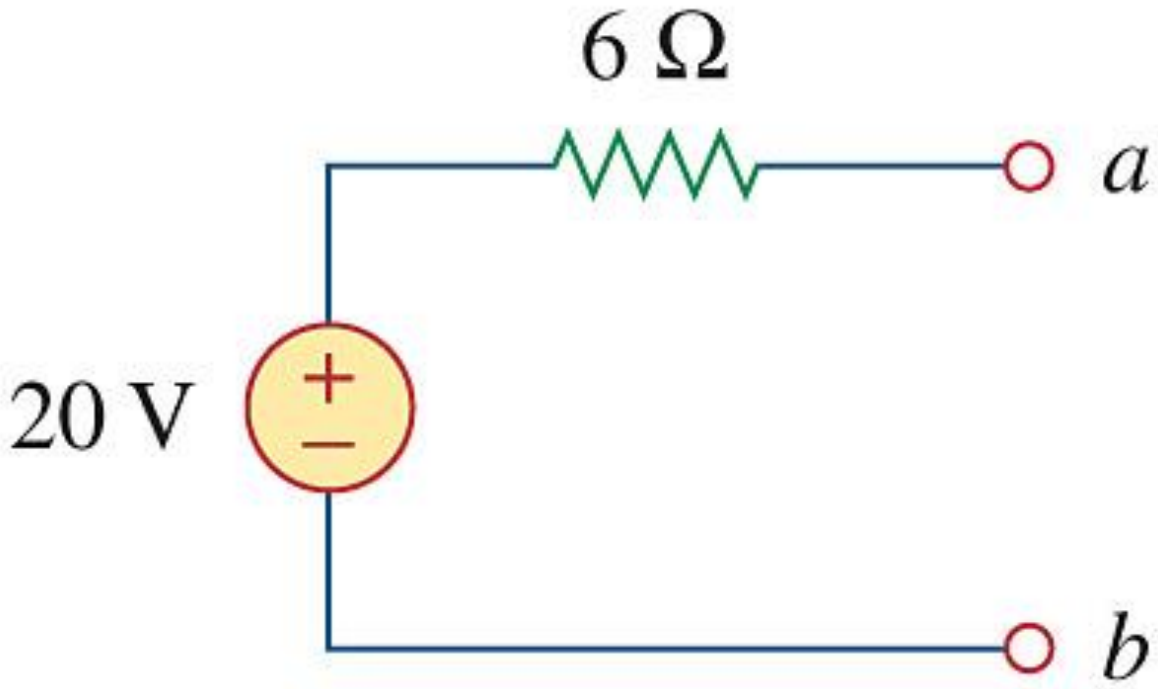
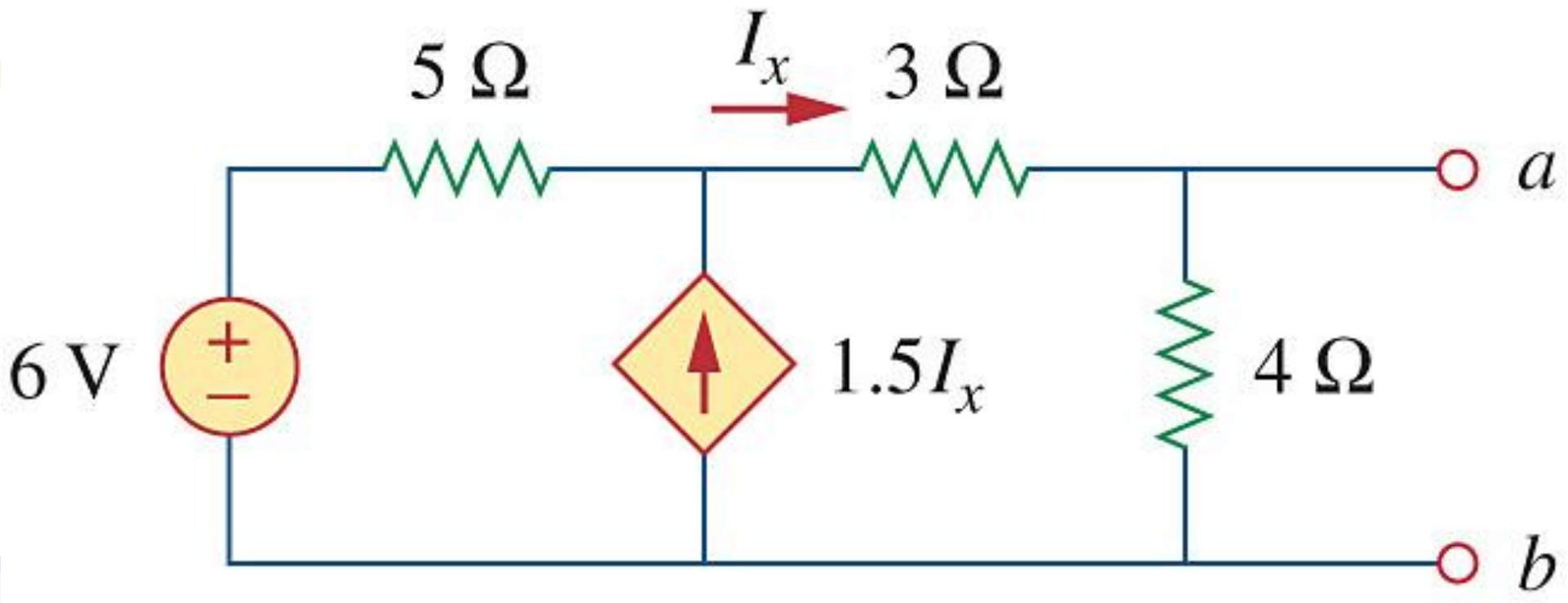
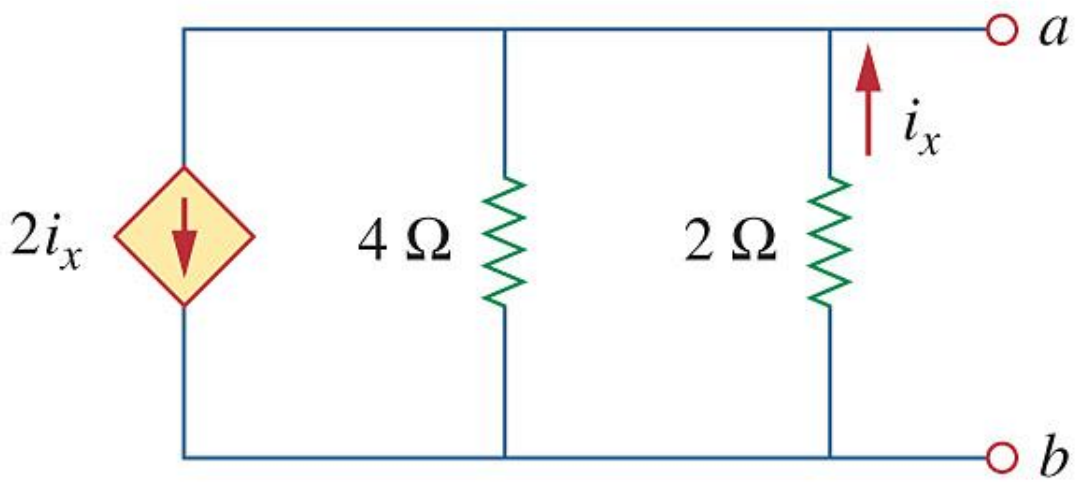
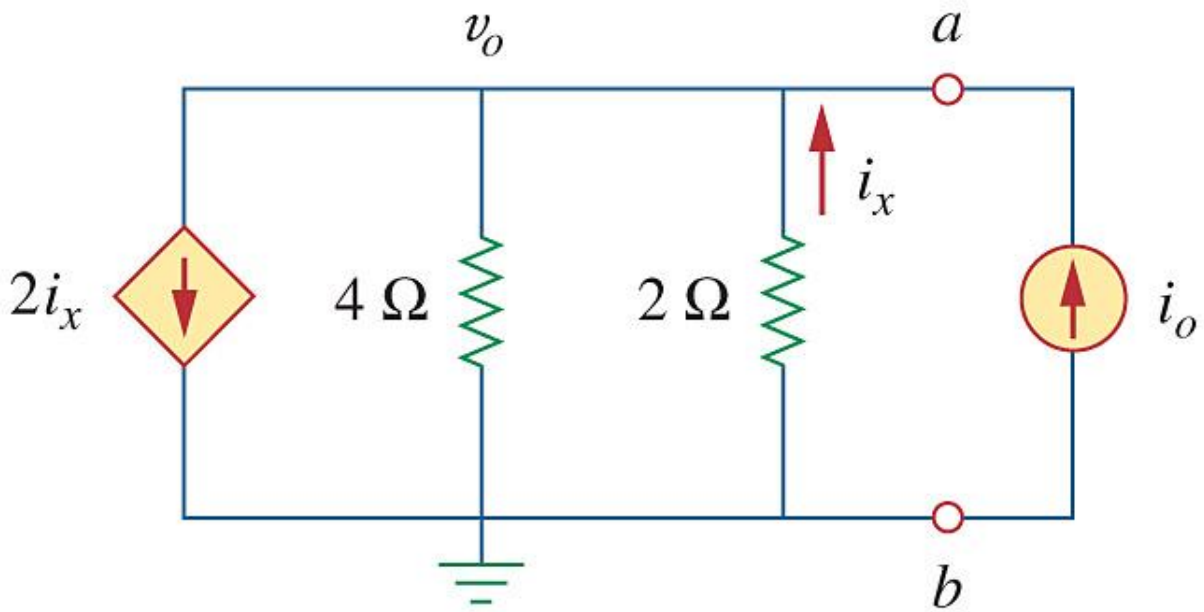






(a)



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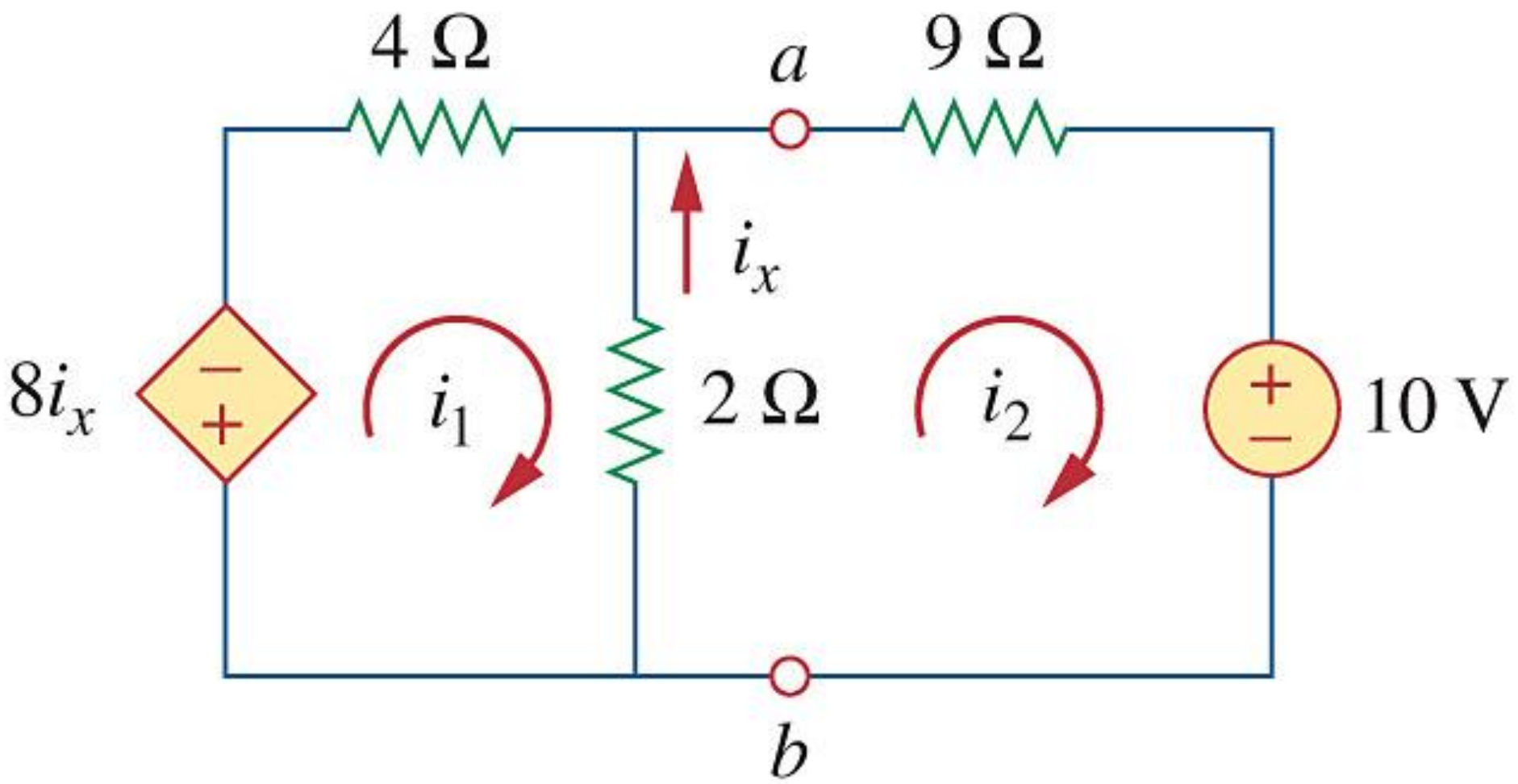
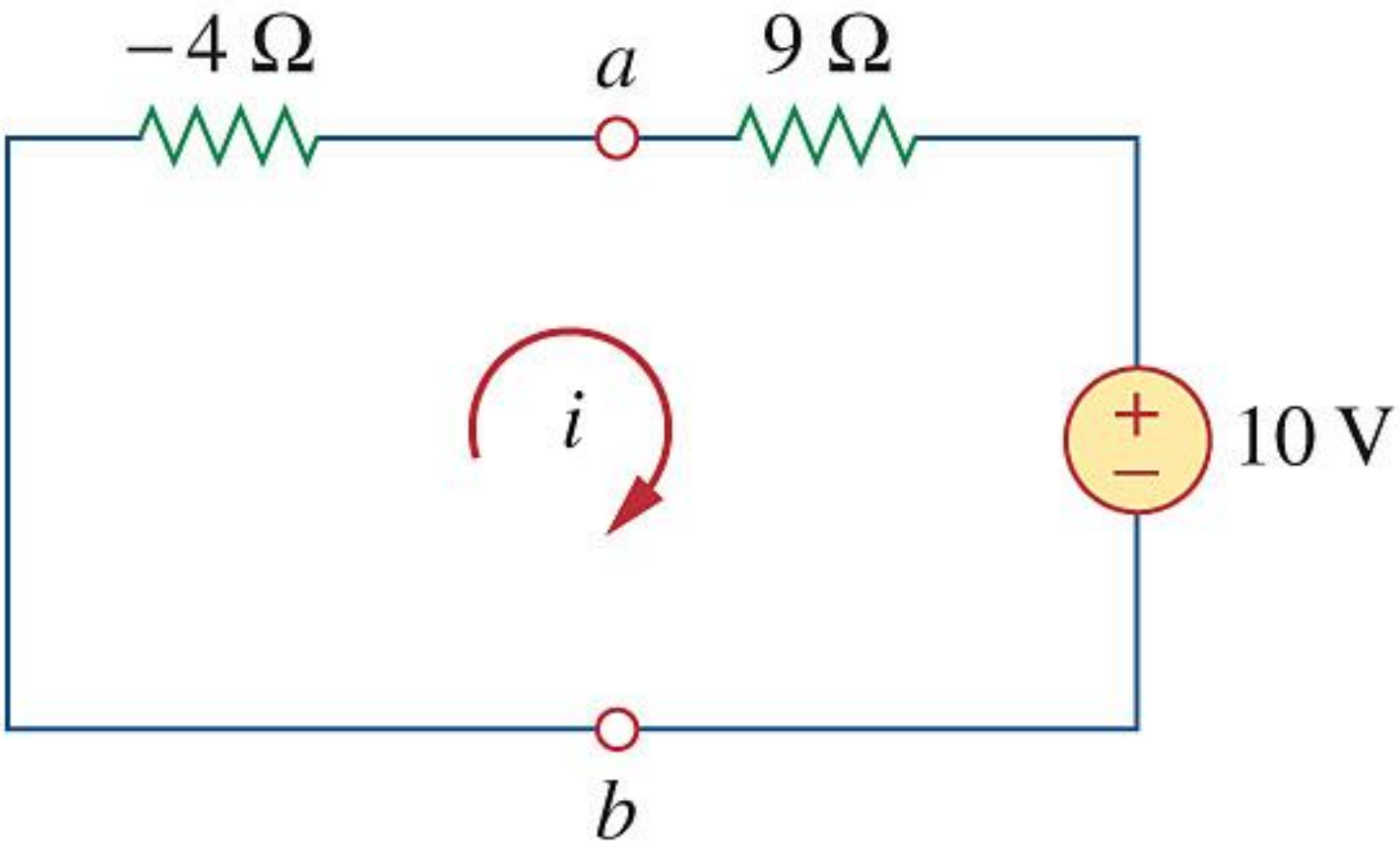


(c)



(d)