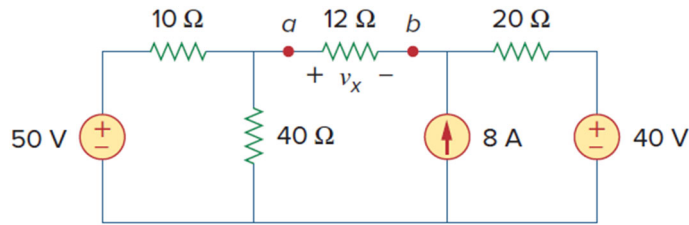


EE1002 Tutorial 7

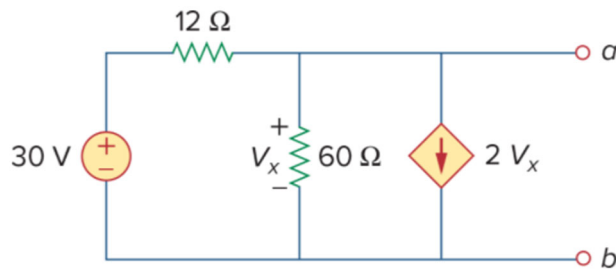
(Questions from the Textbook by Alexander & Sadiku, 7th edition Problems 4.27, 4.47, & 4.54)

1. Apply source transformation to find v_x in the following circuit:



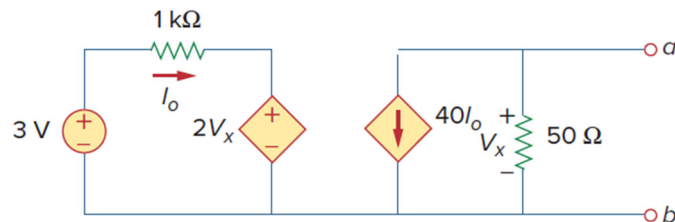
2. Obtain the Thevenin and Norton equivalent circuits of the following circuit with respect to terminals a and b .

[Hint: You may use KCL to determine $V_{Th} = V_{ab} = v_x$. When R_{th} is found, only the independent voltage source should be killed. After killing the independent voltage source, apply a 1A current source across terminals a and b and find the corresponding v_x . R_{th} is then given by voltage/current = $v_x/1$.]



3. Find the Thevenin equivalent between terminals $a-b$ of the circuit in the following figure:

[Hint: Formulate an equation of I_o and V_x from the left loop, and then formulate a second equation of I_o and V_x from the right loop. Finally, solve the two equations to find $V_{th} = V_x$. To find R_{th} , insert a 1-V source at terminals $a-b$ and kill the 3-V independent source. Find the current flowing through this 1-V source and then $R_{th} = \text{voltage/current} = 1/\text{current}$.]



Answers:

1. $v_x = -48\text{V}$.
2. $V_{Th} = 1.1905\text{ V}$, $R_{Th} = 0.4762\ \Omega$, and $I_N = 2.5\text{ A}$.
3. $V_{Th} = 2\text{ V}$, $R_{Th} = -16.67\ \Omega$ (negative value means delivering power to the terminals $a-b$)