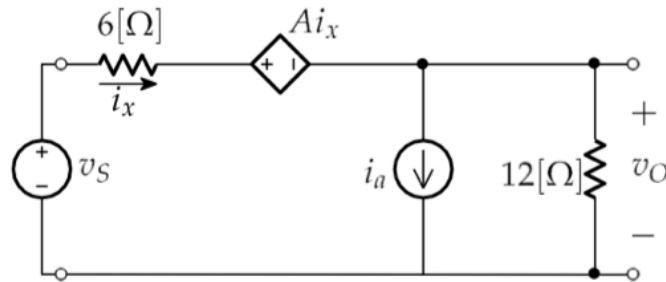


### Problem 1

Use superposition to solve this problem. Choose values for  $i_a$  and  $A$  so that

$$v_0 = 1/2 v_s - 3[V]$$

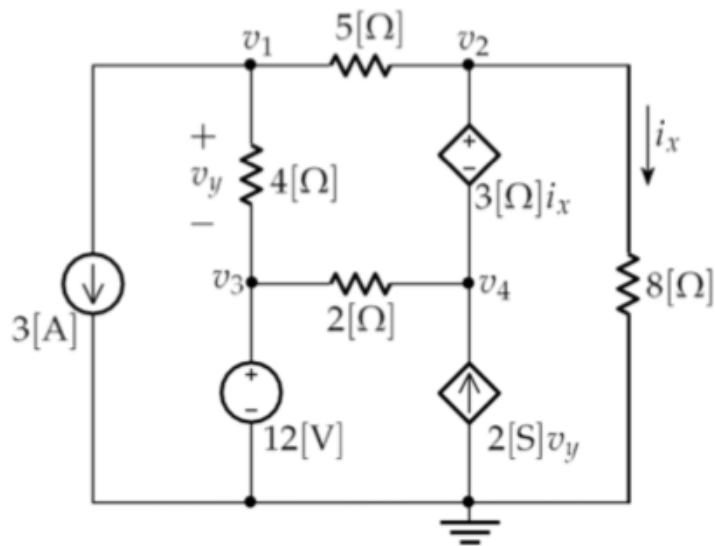
Hint: first find  $A$  by using only the voltage source, and then find the value of  $i_a$  by using only the current source.



Ans:  $A = 6\Omega$ ;  $i_a = 0.5A$

### Problem 2

For the following circuit, use the node voltage method to determine the values of  $v_1$ ,  $v_2$ ,  $v_3$ , and  $v_4$  with respect to the reference node.



Ans:  $v_1=23.5V$ ,  $v_2=52.9V$ ,  $v_3=12V$ , and  $v_4=33.1V$

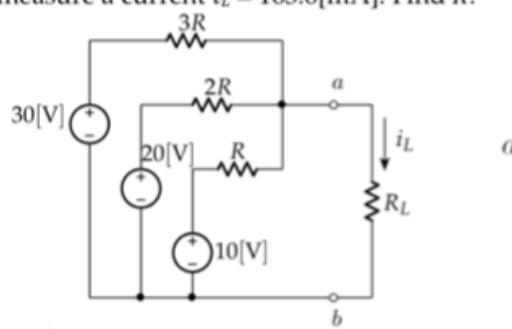
**Problem 3**

For the following circuit, you measure an open circuit potential  $v_{oc} = 180/11$  [V] between nodes  $a$  and  $b$  when you remove the load resistor. When you attach a load resistor  $R_L = 40[\Omega]$ , you

1

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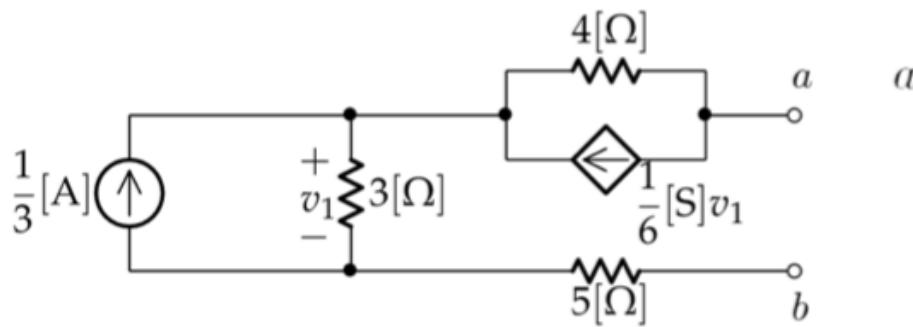
measure a current  $i_L = 163.6[\text{mA}]$ . Find  $R$ .



Ans:  $110\Omega$

### Problem 4

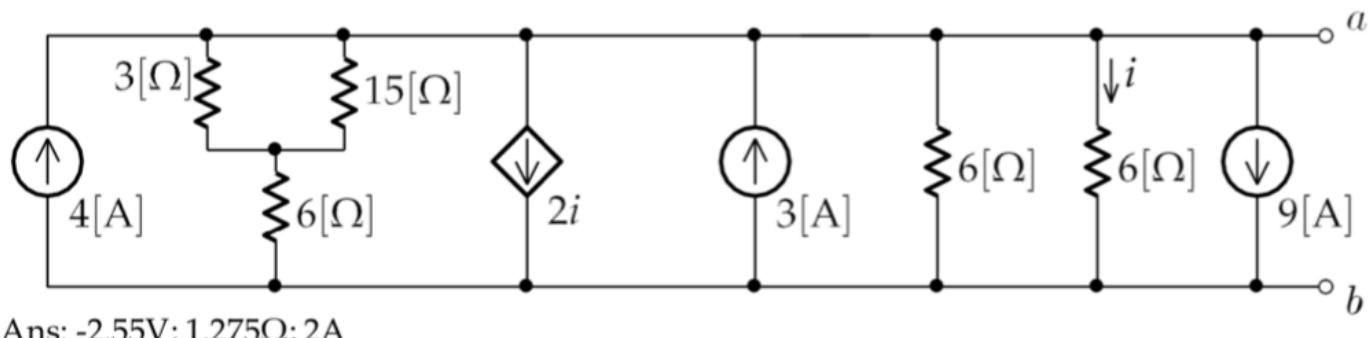
Find the Thevenin equivalent for the following circuit between nodes  $a$  and  $b$ .



Ans:  $1/3V$ ;  $10\Omega$

### Problem 5

Find the Thevenin or Norton equivalent for the circuit below between nodes *a* and *b*.



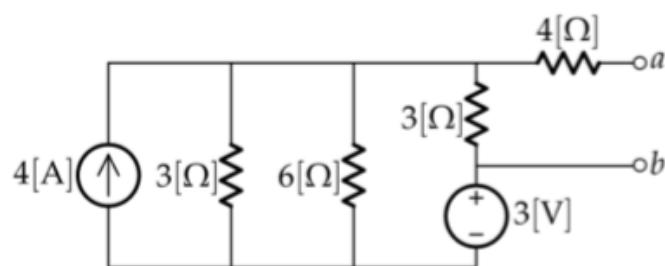
Ans: -2.55V;  $1.275\Omega$ ; 2A

### Problem 6

Find the Thévenin equivalent circuit at terminals  $(a,b)$  in the circuit below.

2

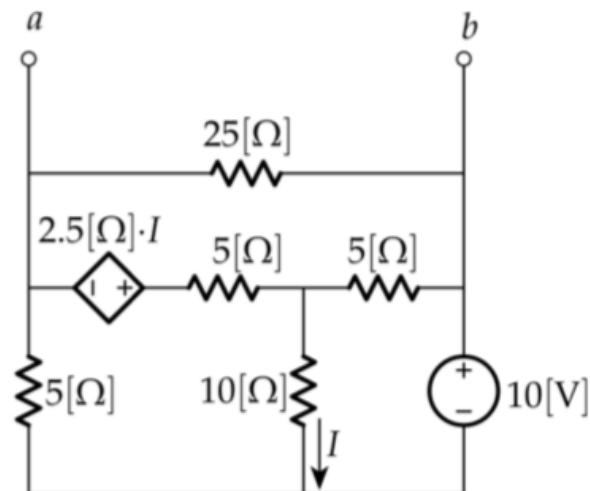
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Ans: 3V;  $26/5 \Omega$

### Problem 7

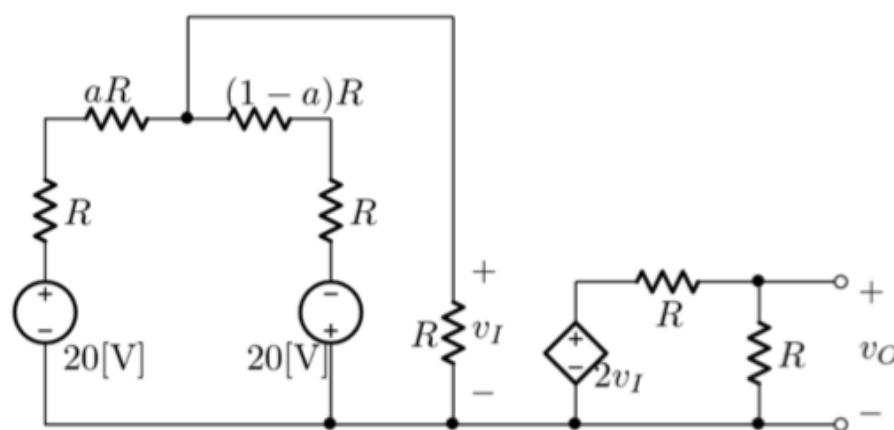
Find the Thévenin equivalent circuit at terminals (a,b) for the circuit below



Ans:  $-50/7V$ ;  $=75/28\Omega$

**Problem 8**

For the following circuit determine the value of  $v_o$  for  $a=1/2$  and  $a=1/4$



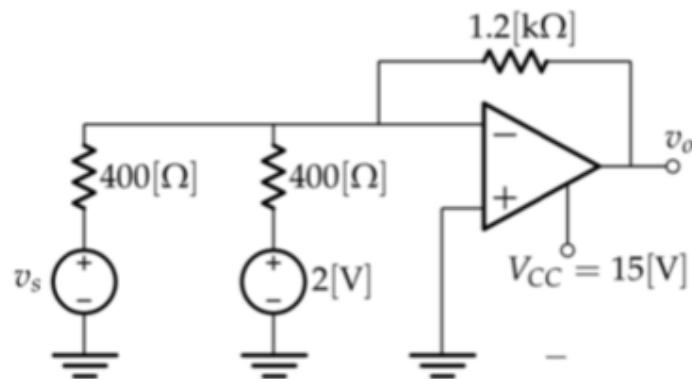
**Problem 9**

- a. Determine the output voltage ( $v_o$ ) in the circuit below in terms of  $v_s$

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- b. Specify the linear range for  $v_s$



Ans:  $-3v_s - 6[V]$  for  $-7[V] < v_s < 3[V]$