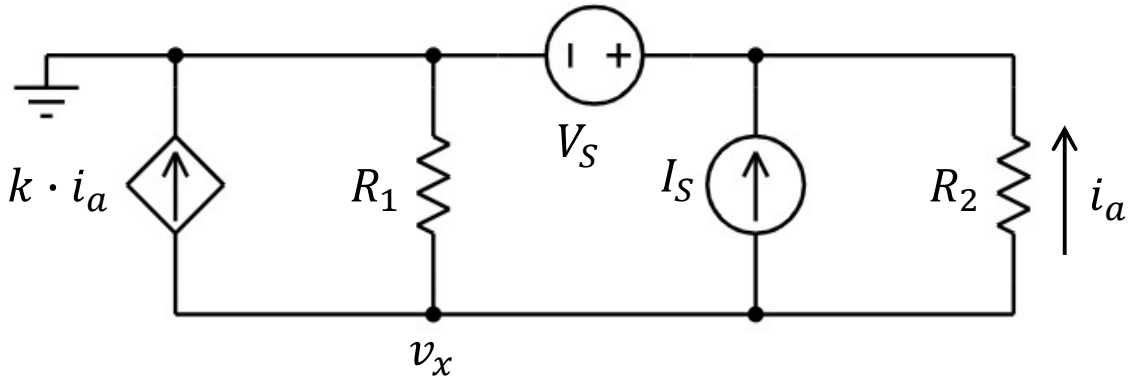
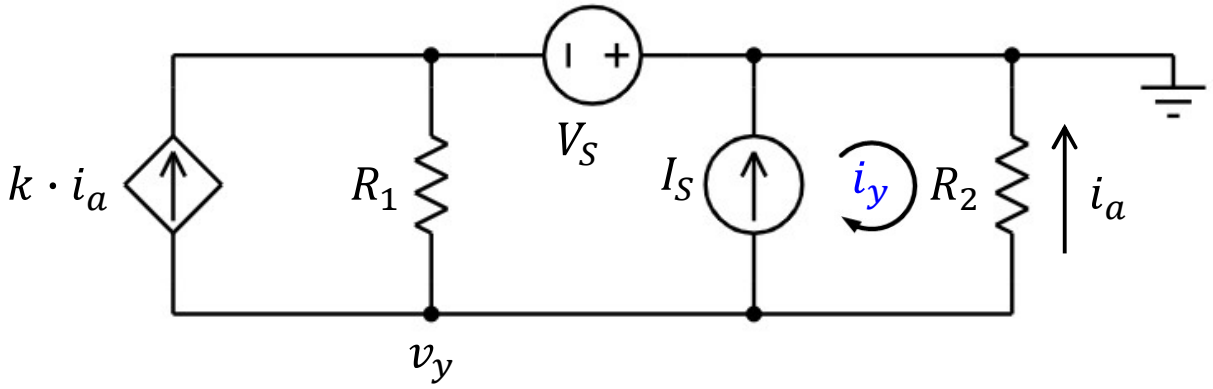
Q1

a. For the circuit below, find the node voltage v_x. You can use any technique. Write your equations symbolically first and only then plug in numbers.



b. For the circuit below (which is identical to the one above, but with the ground moved to a new location), find the node voltage v_y.

c. For the circuit below, find the mesh current i_y.

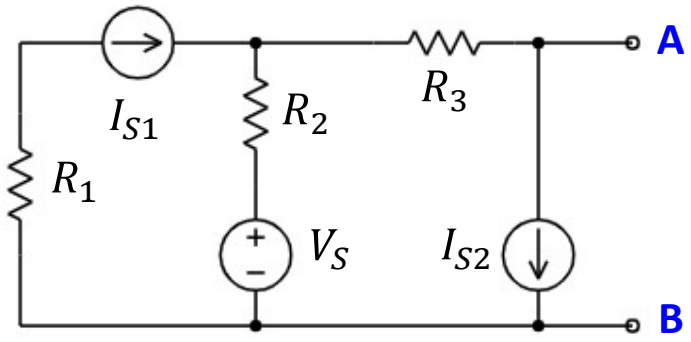


R1:	2 Ω
R2:	2 Ω
k:	2
Vs:	2 V
Is:	1 A

Q2

a. Consider the circuit on the right. The independent sources have the following values: $V_S = X$, $I_{S1} = Y$ and $I_{S2} = Z$, but you are not told what X, Y and Z are.

Find the Thevenin equivalent resistance between A and B.



R1:	1 Ω
R2:	1 Ω
R3:	2 Ω
I1:	2 A
I2:	2 A

b. We now add voltage source V_x to the circuit, as shown below. You are also told:

- If V_S = 0 V, $I_{S1} = Y$, $I_{S2} = 0$ A and V_x = 10 V, we find $i_x = I_1$.
- If $V_S = X/2$, I_{S1} = 0 A, $I_{S2} = Z/2$ and V_x = 0 V, we find $i_x = I_2$.

Consider $V_S = X$, $I_{S1} = Y$, $I_{S2} = Z$ and V_x = 10 V. What is i_x in this case?

c. What is i_x when $V_S = X$, $I_{S1} = Y$, $I_{S2} = Z$ and V_x = 22 V ?

(Hint: you can solve this using part a and b)