ECE 203

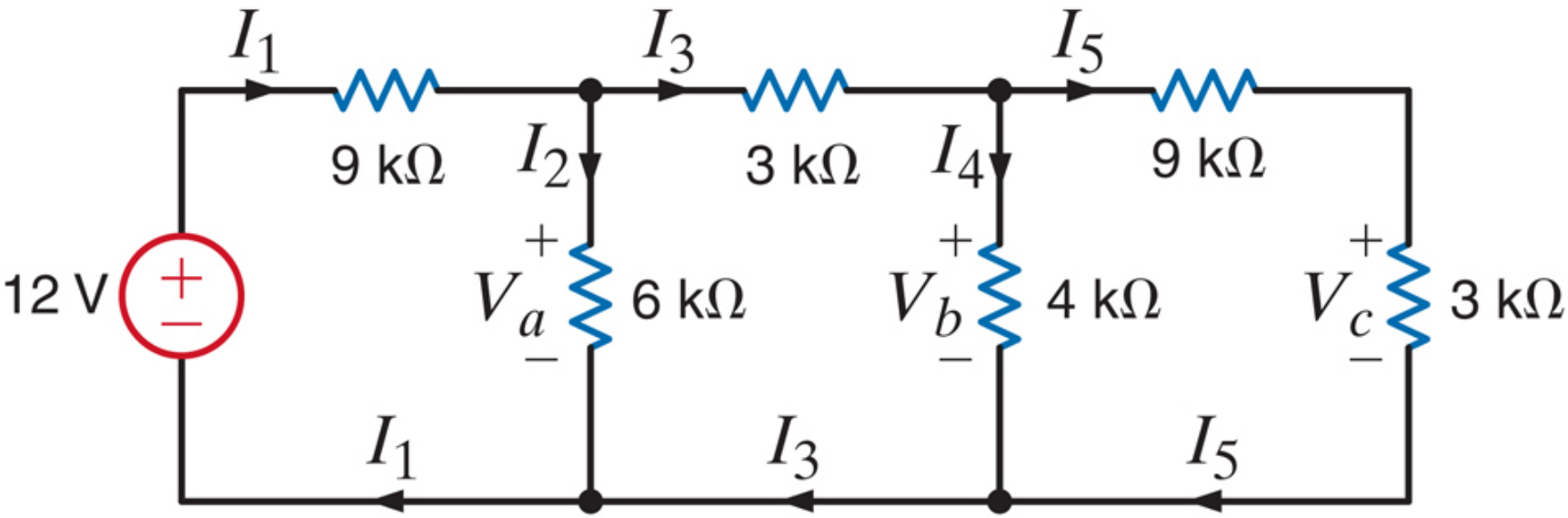
Circuits I

Solving circuit problems

Lecture 3-3

Circuits with Series/Parallel Resistors

Find all currents (I_1 thru I_5) and all voltages (V_a thru V_c) in this circuit:

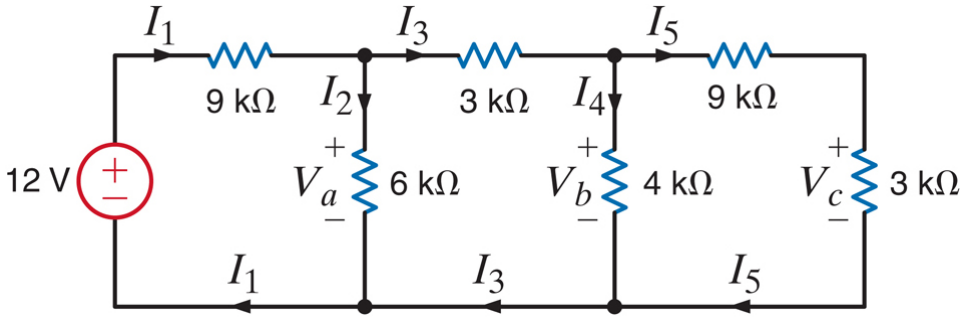


We now have enough knowledge to solve a wide range of circuit problems.

This lecture will be very short- I'll introduce another technique, then I will do a series of examples.

Ultimate goal is to be able to solve for the voltage and current anywhere in a circuit.

Solution #1

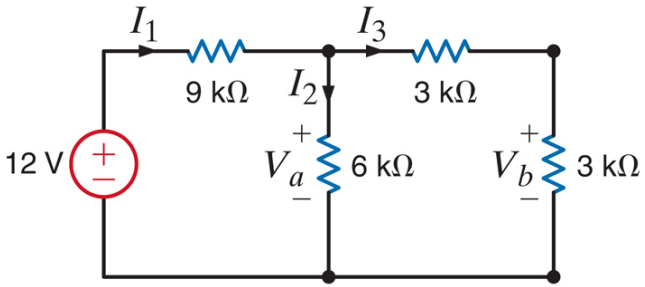


$$V_b = 4\text{k}I_4$$

$$I_4 = \frac{\frac{3}{2}}{4\text{k}} = \frac{3}{8}\text{ mA}$$

$$I_5 = \frac{4\text{k}}{4\text{k} + (9\text{k} + 3\text{k})} I_3 = \frac{1}{8}\text{ mA}$$

$$V_c = I_5(3\text{k}) = \frac{3}{8}\text{ V}$$



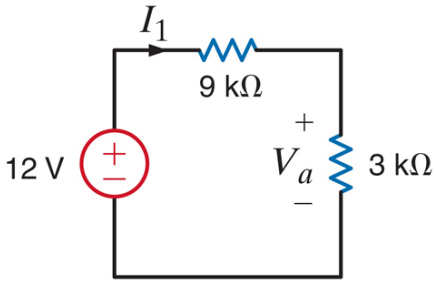
$$I_2 = \frac{3}{6\text{k}} = \frac{1}{2}\text{ mA}$$

$$I_1 = I_2 + I_3$$

$$1 \times 10^{-3} = \frac{1}{2} \times 10^{-3} + I_3$$

$$I_3 = \frac{1}{2}\text{ mA}$$

$$V_b = 3\text{k}I_3 = \frac{3}{2}\text{ V}$$



$$V_a = I_1(3\text{k}) = 3\text{ V}$$

$$I_1(9\text{k} + 3\text{k}) = 12$$

$$I_1 = 1\text{ mA}$$