EEE104
Circuit Analysis I

Ankara University

Faculty of Engineering

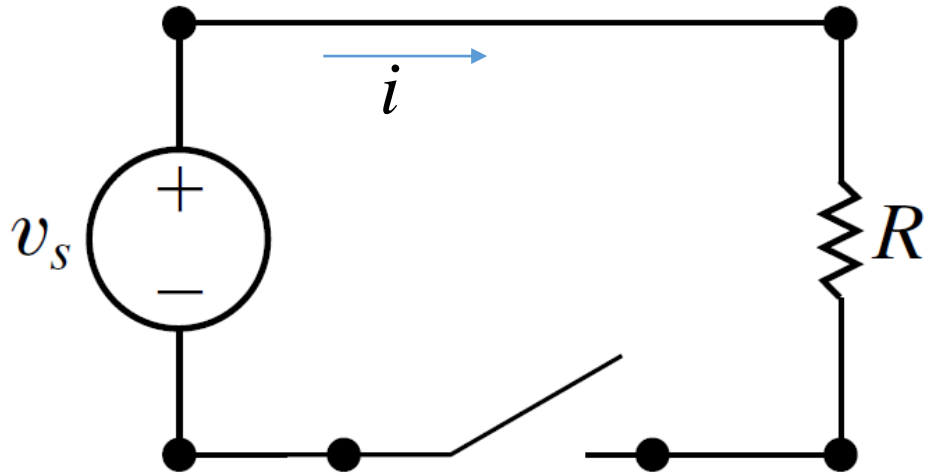Electrical and Electronics Engineering Department

Circuit Elements

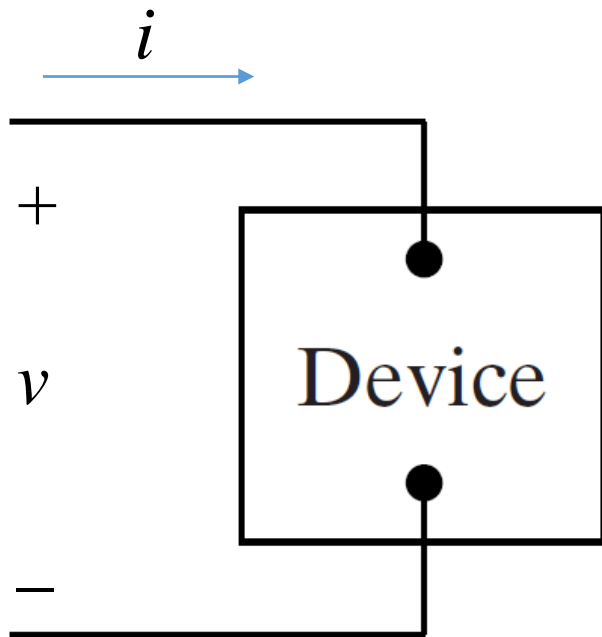EEE104 Circuit Analysis I

Lecture 3
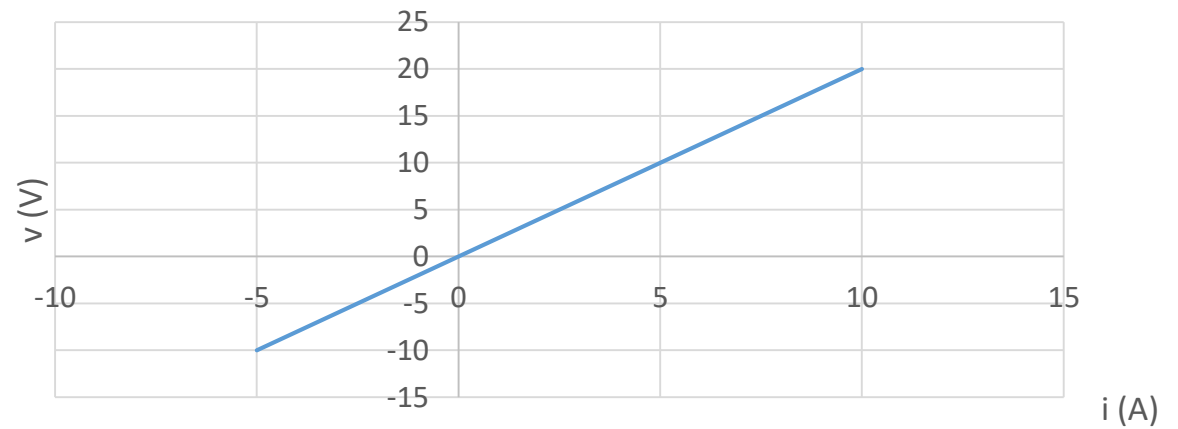
Agenda

- Circuit Model
- Kirchhoff's Laws

- A Circuit Model with a Switch

Measurements

Current (i)	Voltage (v)
-5	-10
0	0
5	10
10	20

$$\Rightarrow R = 2 \ \Omega$$

Kirchhoff's Laws
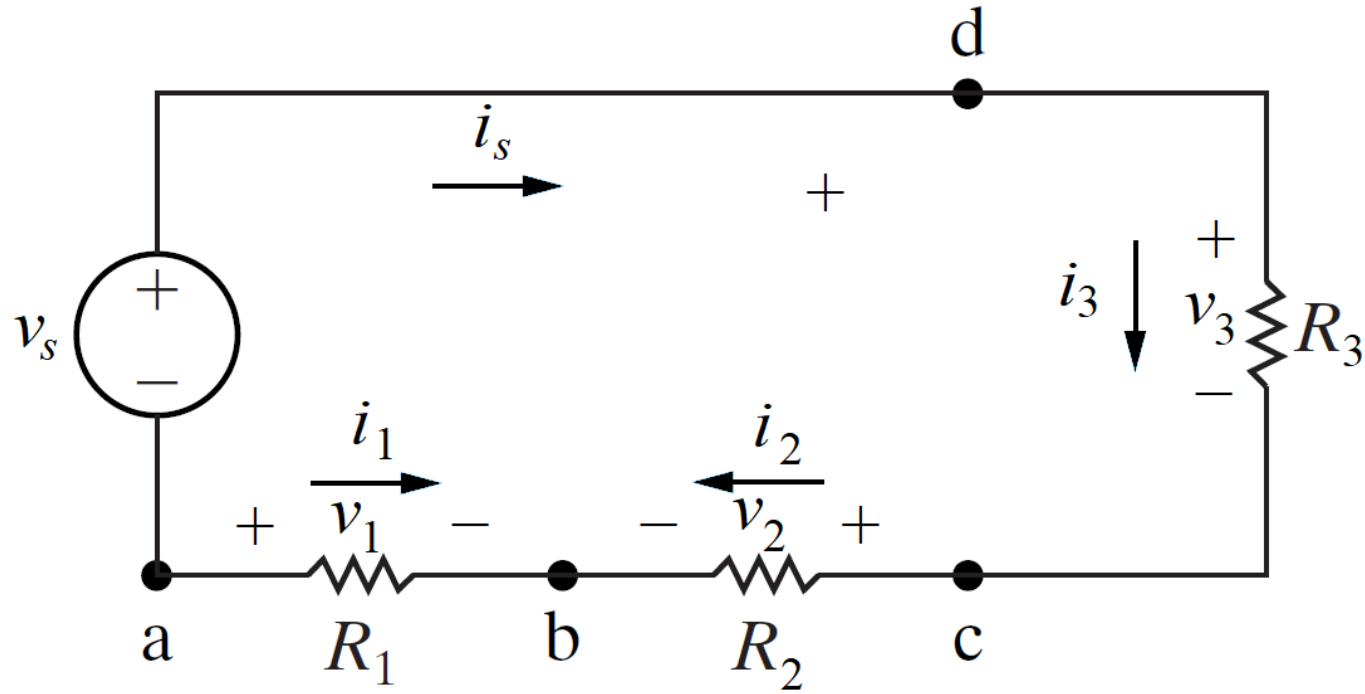
a, b, c, d: Nodes

$$v_1 = i_1 R_1$$
$$v_2 = i_2 R_2$$
$$v_3 = i_3 R_3$$

- Kirchhoff's Current Law

  For a node;

  (a) Total of incoming currents are zero [Incoming (+), outgoing (-)]

  or

  (b) Total of outgoing currents are zero [Incoming (-), outgoing (+)]

  or

  (c) Total of incoming currents equals total of outgoing currents [Incoming (+), outgoing (+)]

     - Node a: $-i_1-i_s=0$

     - Node b: $i_1+i_2=0$

     - Node c: $-i_2+i_3=0$

     - Node d: $i_s-i_3=0$

     [Considering (a)]

- Kirchhoff's Voltage Law

Total of voltages in a mesh (closed loop) is zero

$v_3+v_2-v_1-v_s=0$

Reference

- Electric Circuits, Tenth Edition, James W. Nilsson, Susan A. Riedel Pearson, 2015