ECE 201, Section 3
Lecture 2

Prof. Peter Bermel

August 22, 2012

Homework Announcements

- Due at 4:30 pm on the listed date at EE 325B (Wanda Dallinger's office)

- Please write "ECE201-3" and your name at the top legibly when you submit the homework

Office Hours in EE 026

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:30 - 9:00					
9:00 - 9:30					
9:30 - 10:00					
10:00 - 10:30					
10:30 - 11:00					
11:00 - 11:30					
11:30 - 12:00					
12:00 - 12:30					
12:30 - 1:00					
1:00 - 1:30					
1:30 - 2:00					
2:00 - 2:30					
2:30 - 3:00					
3:00 - 3:30					
3:30 - 4:00					
4:00 - 4:30					
4:30 - 5:00					

|	Name	Monday	Tuesday	Wednesday	Thursday	Friday	Total
	Andrew	3.5	4.5	3.5	1.5		13
	Bharath	1.5	3.5	2	2	4	13
	John	3	3	3	4		13
	Tanmay	3.5	1	3.5	2	3	13
	Amir					3	3
	Alejandro	5.5		2.5	3	2.5	13.5

Voltage

- Defined as a difference in electric potential
- Given in units of volts, or joules per coloumb
- Energy E = qV
- Voltage drop V_{AB} between two points is:
  - Path-independent ($V_{AB} = V_A - V_B$)
  - Unique
  - Directionally dependent (e.g., $V_{AB} = -V_{BA}$,
  $V_A - V_B = -(V_B - V_A)$

Example 1
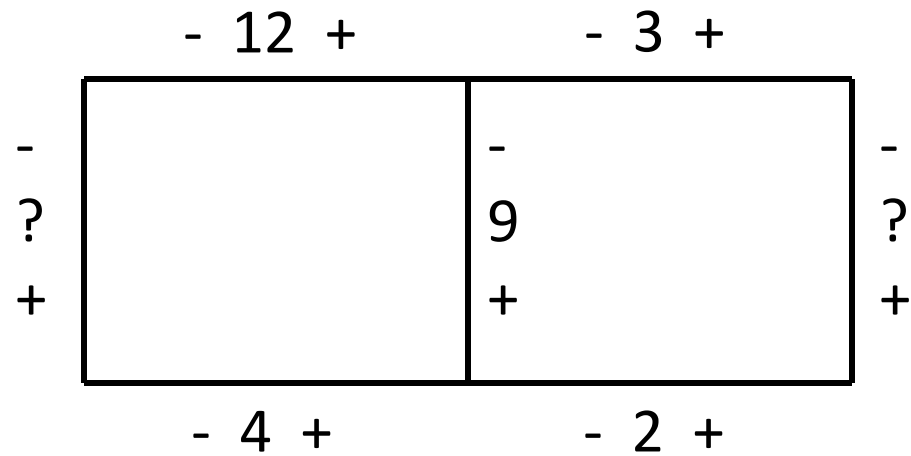
Example 1: Solution
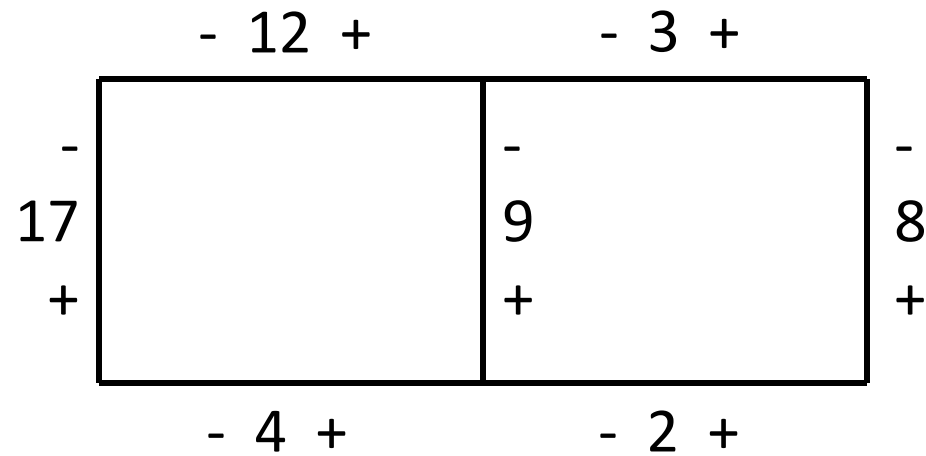
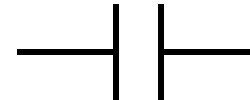# Circuit Elements

- Two terminal devices:
    - Batteries − V(t)
    - Resistors − V=IR
    - Capacitors − V=Q/C
    - Inductors − V=L dI/dt
- Three terminal device: op-amp
- Four terminal device: transformer
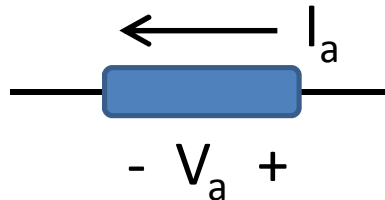
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Power in Circuits

$$P(t) = I(t)V(t)$$

$$U = \int I(t)V(t)\ dt$$

$\sum_{i=1}^{N} P_i(t) = 0$, for a closed circuit of N elements, at all times

Passive Sign Convention

- Defined as when current flows from positive to negative voltage
- Allows one to read P=IV (with correct sign)
- Positive values associated with resistors
- Negative values associated with voltage sources
- Active sign convention is the opposite

Example 2

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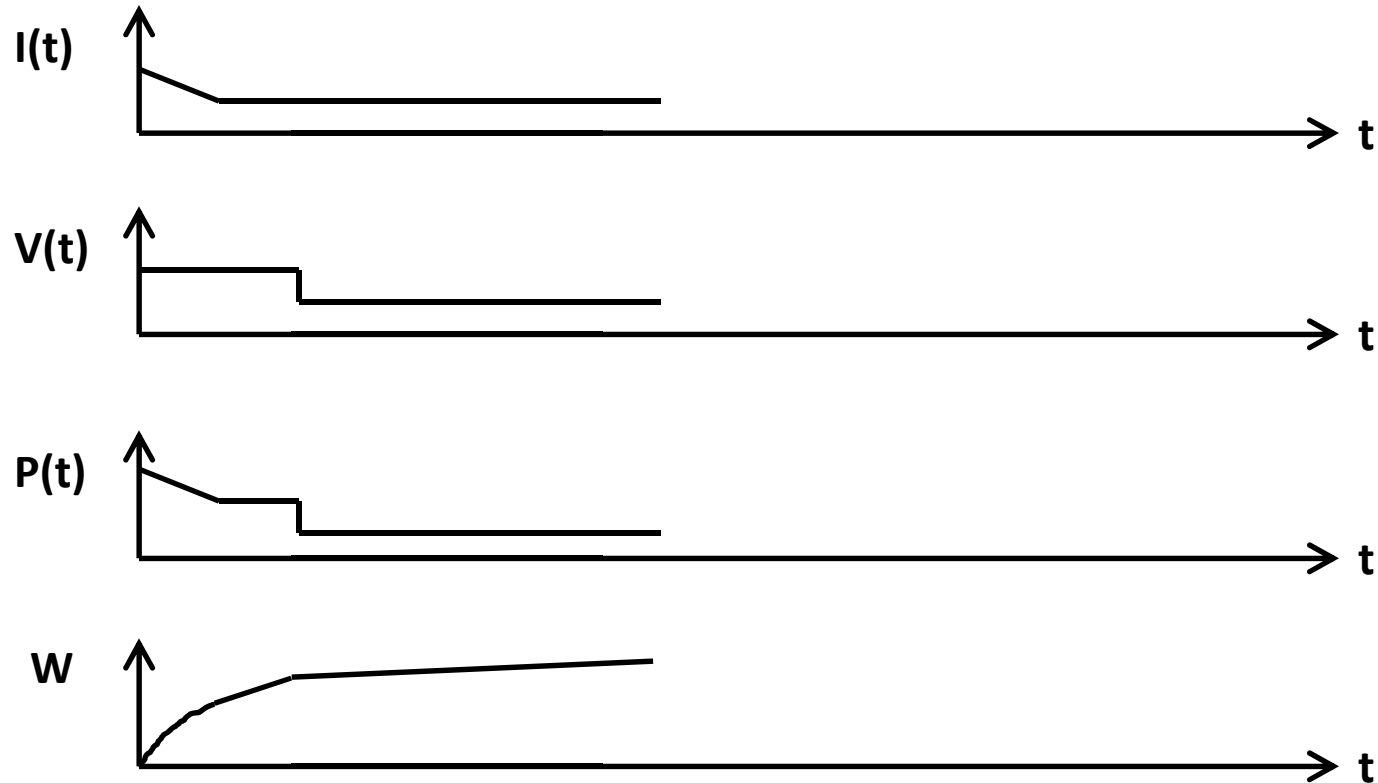
Ideal Sources

- An abstraction of real devices, insensitive to operating environment
- Ideal voltage source
  - Fixed voltage V(t)
  - Example: battery
- Ideal current source
  - Fixed current I(t)
  - Example: lightning

Controlled Ideal Sources

- Can use current or voltage to control output current or voltage

Control type

	Voltage	Current
Voltage	VCVS ($V=\mu v_x$)	CCVS ($V=IR$)
Current	VCCS ($I=gV$)	CCCS ($I=\beta I_x$)

Output type

Key Definitions

- **Short Circuit** – connection with zero resistance

- **Open Circuit** – connection with infinite resistance

- **Power** – rate at which work is performed

Homework #2 for Friday

- DeCarlo & Lin, 3rd Edition, Chapter 1
  - Problem 10
  - Problem 12 [Note 'F' above I_D should be 'D']
  - Problem 17
- All homework posted on Blackboard