ECE 201, Section 3
Lecture 1

Prof. Peter Bermel

August 20, 2012

Key Policies

- Textbook: "Linear Circuits", 3rd Edition, DeCarlo & Lin
- Communication:
  - Blackboard: http://www.itap.purdue.edu/learning/tools/blackboard/
  - Email: pbermel@purdue.edu
- Full list of policies given on handout; also available under Syllabus on Blackboard

Grading

Grading Item	Points	Date
Exam #1	100	9/19/12
Exam #2	100	10/17/12
Exam #3	100	11/15/12
Final Exam	200	TBA
Homework	100	8/22/12-12/7/12
TOTAL	600	

- Numerical grades of 60% or above will pass (barring cheating)
- Roughly speaking: A's will be 90% +; B's 80-89%; C's 70-79%
- Final letter grades will be assigned at my discretion

Homework

- Homework is absolutely essential to learn the material & prepare for exams
- 40 total (short) homework assignments this semester; lowest 4 dropped
- Due at 4:30 pm on the listed date at EE 325B

Exams

	Date	Material
Exam #1	9/19/12	Lectures 1-11; Chapters 1-3; 5
Exam #2	10/17/12	Lectures 12-21; Chapters 6-8, except 6.5 and 8.8
Exam #3	11/15/12	Lectures 22-33; Chapters 9, 4, 6.5, 8.8, 10
Final Exam	TBA	Lectures 1-40; Chapters 1-11

- Exams will be multiple choice
- Given in the evenings
- Will get a day off from class

Getting Help

- Most material posted on Blackboard
- Contact your peers, TAs or me through the messaging system
- ECE 201 Help Room: EE 026
  - Staffed by course TAs
  - Open most business hours: 8:30 am – 5 pm, Monday through Friday

Key Definitions

- **Circuit** – an energy processor
- **Charge** – electrical property of matter (C)
- **Elementary charge** – 1.602×10^{-19} C
- **Current** – net flow of charge per unit time (A)
- **Conductor** – allows the flow of current
- **Insulator** – impedes the flow of current

Example 1: Current Flow

- Semiconductor slab:
  - Electrons: -1 μC/cm, -5 km/s
  - Holes: 10 μC/cm, 2 km/s
- Total current:

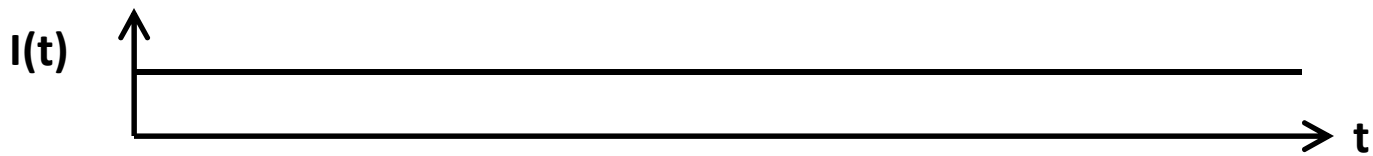
  I=(-1 μC/cm)(-5 km/s) +(10 μC/cm)(2 km/s)

  = 0.5 A + 2 A

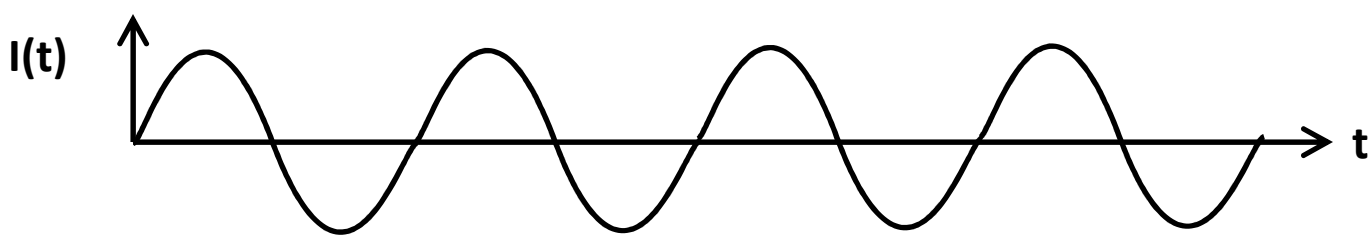
  = 2.5 A

Types of Current

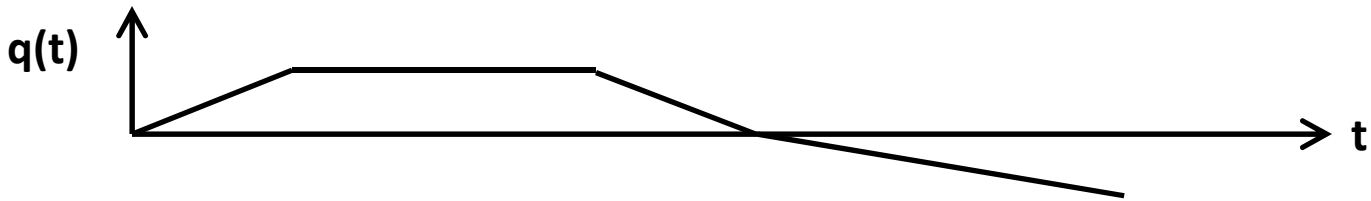
- Direct current (DC)
  - Constant stream of current over time
  - Example: AA batteries



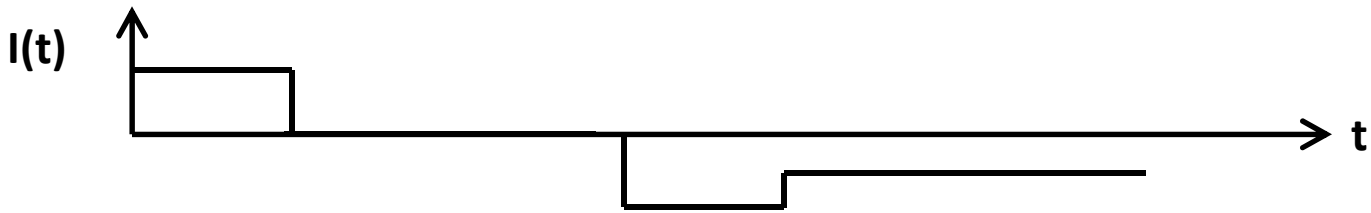
- Alternating current (AC)
  - Sinusoidally oscillating stream of current over time
  - Example: wall plug outlet offers 60 Hz AC



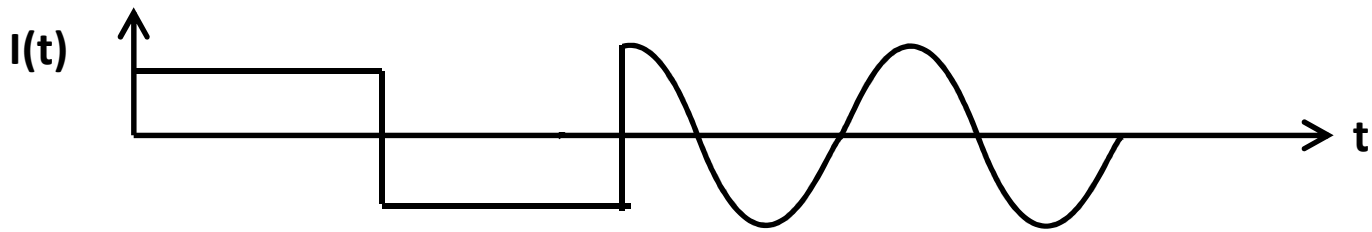
Example 2: Calculating Current from Charge



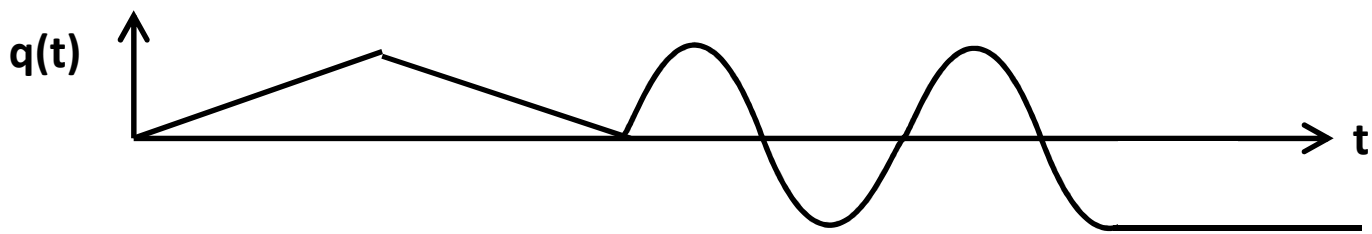
$$I(t) = \frac{dq}{dt}$$



Example 3: Calculating Charge from Current



$$q(t) = \int I(t)dt$$



Key Formulas to Calculate Current from Charge

$$\frac{d}{dt}t^n = nt^{n-1}$$

$$\frac{d}{dt}\sin\omega t = \omega\cos\omega t$$

$$\frac{d}{dt}\cos\omega t = -\omega\sin\omega t$$

$$\frac{d}{dt}e^{-t/\tau} = -\frac{e^{-t/\tau}}{\tau}$$

Key Formulas to Calculate Charge from Current

$$\int t^n \, dt = \frac{t^{n+1}}{n+1} + C$$

$$\int \sin \omega t \, dt = -\frac{\cos \omega t}{\omega} + C$$

$$\int \cos \omega t \, dt = \frac{\sin \omega t}{\omega} + C$$

$$\int e^{-t/\tau} \, dt = -\tau e^{-t/\tau} + C$$

Homework for Wednesday

- DeCarlo & Lin, 3rd Edition, Chapter 1
  - Problem 5
  - Problem 7(b)
  - Problem 8
- All assignments for the semester in your handout and posted on Blackboard