# EE 42 - Introduction to Electronics for Computer Science 

Fall 2003,
Prof. A. R. Neureuther Dept. EECS, 510 Cory neureuth@eecs.berkeley.edu 642-4590 UC Berkeley Office Hours M1, Tu, Tu 10:30-11:30, F 1
Course Web Site

# Problem Set \# 1 <br> Due:1 PM Sep 3rd, 2003 in box outside 275 Cory 

## Announcements:

Go to a discussion section this week and get acquainted with your TA, the course schedule and a basic circuit. (M 11, M 3, W 11, Th 1, F 1 in 293 Cory Hall) Professor Neureuther will hold Office Hours in 100 GPB on Tu and Th from 10:30-11 and then go to 510 Cory for the 11-11:30 part of the Office Hour.

Reading: Chapter 0 and 1 Schwarz and Oldham.
1.1 Digital Samples: Problem 0.5 in Schwarz and Oldham but approximate by a sample and hold process in which each sample is a bar in a bar graph with the height of the analog signal and centered at the sample time.
1.2 Charge and Current: A sample of a material is $1 \mathrm{~mm} \times 1 \mathrm{~cm} \times 1 \mathrm{~cm}$ and has a density of $10^{22}$ atoms per $\mathrm{cm}^{3}$. Suppose that $0.001 \%$ of the atoms have an extra electron.
a) Find the number of atoms in the sample.
b) Find the net charge of the sample.
c) Find the current flowing in at a constant rate required to neutralize the sample in 1 second.
d) Find the current flowing out at a constant rate required to neutralize the sample in 1 ps ( $10^{-12}$ seconds).
1.3 Kirchhof's Laws and Power: Circuit P1.3 is shown below.
a) Use KCL at node C to find $\mathbf{I}_{\mathrm{R} 2}$ and then $\mathrm{V}_{\mathrm{C}}$.
b) Use KCL at B to find $\mathbf{I}_{\mathrm{R} 1}$ and then $\mathrm{V}_{\mathrm{B}}$.
c) Use KVL to find the voltage on the current source $V_{\mathrm{S} 2}$.
d) Find the power into the voltage source (circle with $\mathbf{V}_{\mathbf{S} 1}$ and $\mathbf{I}_{\mathbf{S} 1}$ ).
e) Find the power into the current source (diamond with $\mathbf{V}_{\mathrm{S} 2}$ and $\mathbf{I}_{\mathbf{S} 2}$ ).
f) Show that the sum of the power for all elements in the circuit is zero.


