# EE40 Spring 1998 <br> Midterm \#1 <br> S. Schwarz, R. M. White 

## Problem \#1



The nonlinear circuit element NL in Fig. (a) has the I-V characteristic shown in (b). (Sign conventions for V, I are as shown.) Find Vx with respect to ground.

Problem \#2


Box \#1 is represented by a Thevenin equivalent with VT1 $=5 \mathrm{~V}, \mathrm{RT} 1=3000$ ohms. For Box $\# 2, \mathrm{VT} 2=-6 \mathrm{~V}, \mathrm{RT} 2=$ 2000 ohms. The two boxes are connected together as shown.
a) Find the voltage at node A with respect to ground.
b) Find the power flow (in watts) between the boxes, in the direction from Box 1 into Box \#2.

## Problem \#3



In the above circuit $\mathrm{Vo}=10 \mathrm{~V}, \mathrm{R} 1=1000$ ohms, $\mathrm{R} 2=2000 \mathrm{ohms}$, rho $=5000$, beta $=0.7$. Find the volatge at node A with respect to ground. (For ease of grading, please write equations using letter symbols, solve the equations, and then substitute numerical values as the final step.)

## Problem \#4



In the above circuit all the op-amps are "ideal".
a) Find Va (the voltage at node A with respect to ground):
b) Find Vb :
c) Find Vc:
d) Find Vd:

## Posted by HKN (Electrical Engineering and Computer Science Honor Society) University of California at Berkeley

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