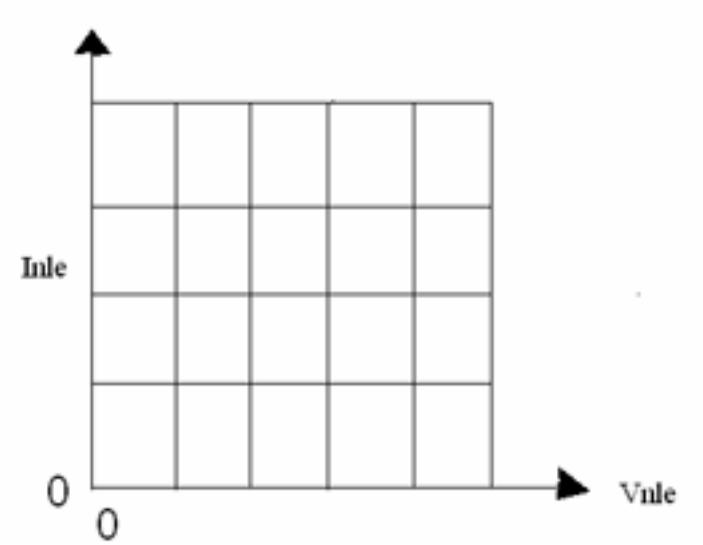
EE40, Fall 2005, MT1, Neureuther

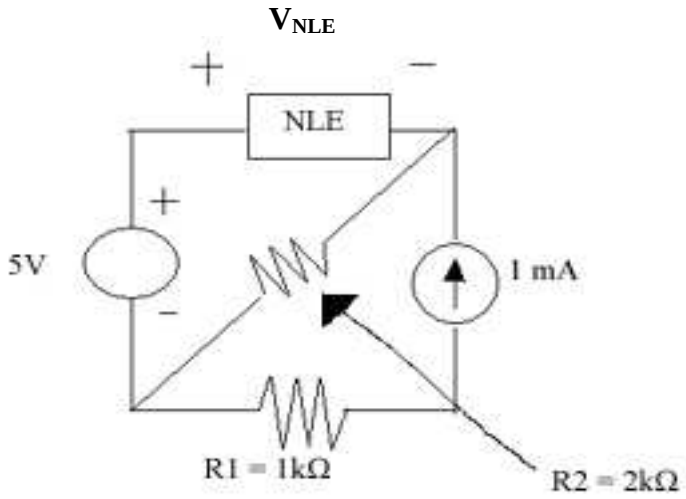
I (35 Points) Basic Circuit Analysis

a) (15 Points) From the data in the table below, sketch the current versus voltage for the nonlinear element (NLE) and label the current and voltage of all known points.

$\mathbf{Voltage_{NLE}}$	$\mathbf{Power_{NLE}}$	$\mathbf{Current_{NLE}}$
Volts	**mW**	**mA**
0	**0**	
1	**1**	
3	**2**	

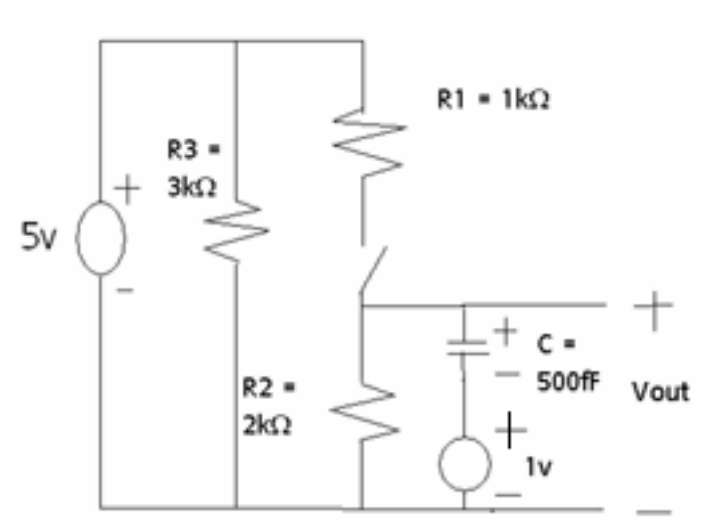


b) (20 points) Find the Norton equivalent circuit seen by the NLE in the circuit below.



II (40 Points) Transient

a) (10 Points) Find the time constant to change the charge on the capacitor when the switch is closed.



b) (14 Points) The switch is opened. At the **instant that Vout is 3V**, find the **energy** in the capacitor and **power** into the capacitor

c) (16 Points) The switch is opened. **Define the time that Vout is 3V to be $t_{OBSERVE}$.** Find the **capacitor voltage** as a function of time for $t>t_{OBSERVE}$

III (35 Points) Circuit Analysis

Find the Thevenin resistance see looking into the terminals of the circuit below. Clearly label any current or voltages that you use on the circuit diagram.

Be sure to at least get some partial credit by writing at least one node equation for this circuit.