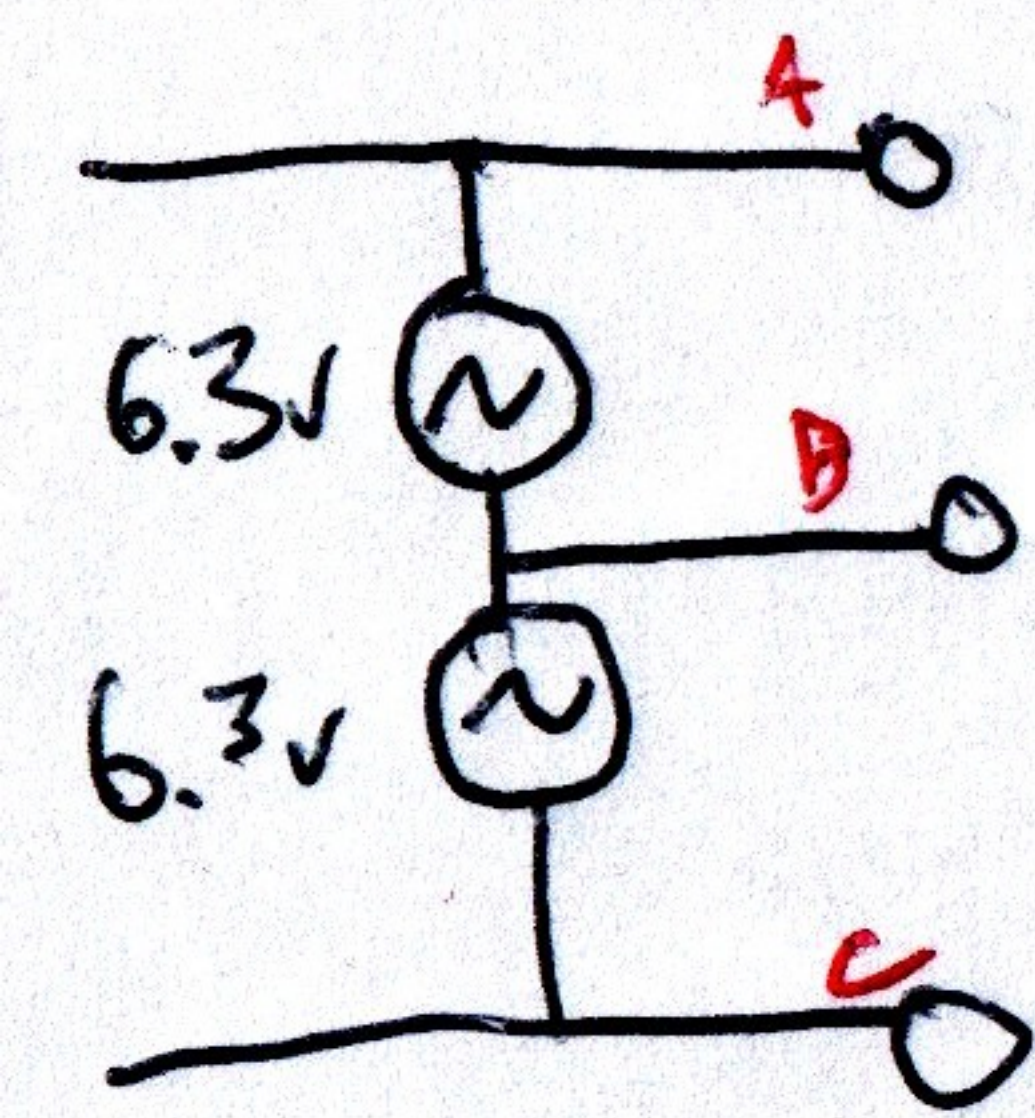
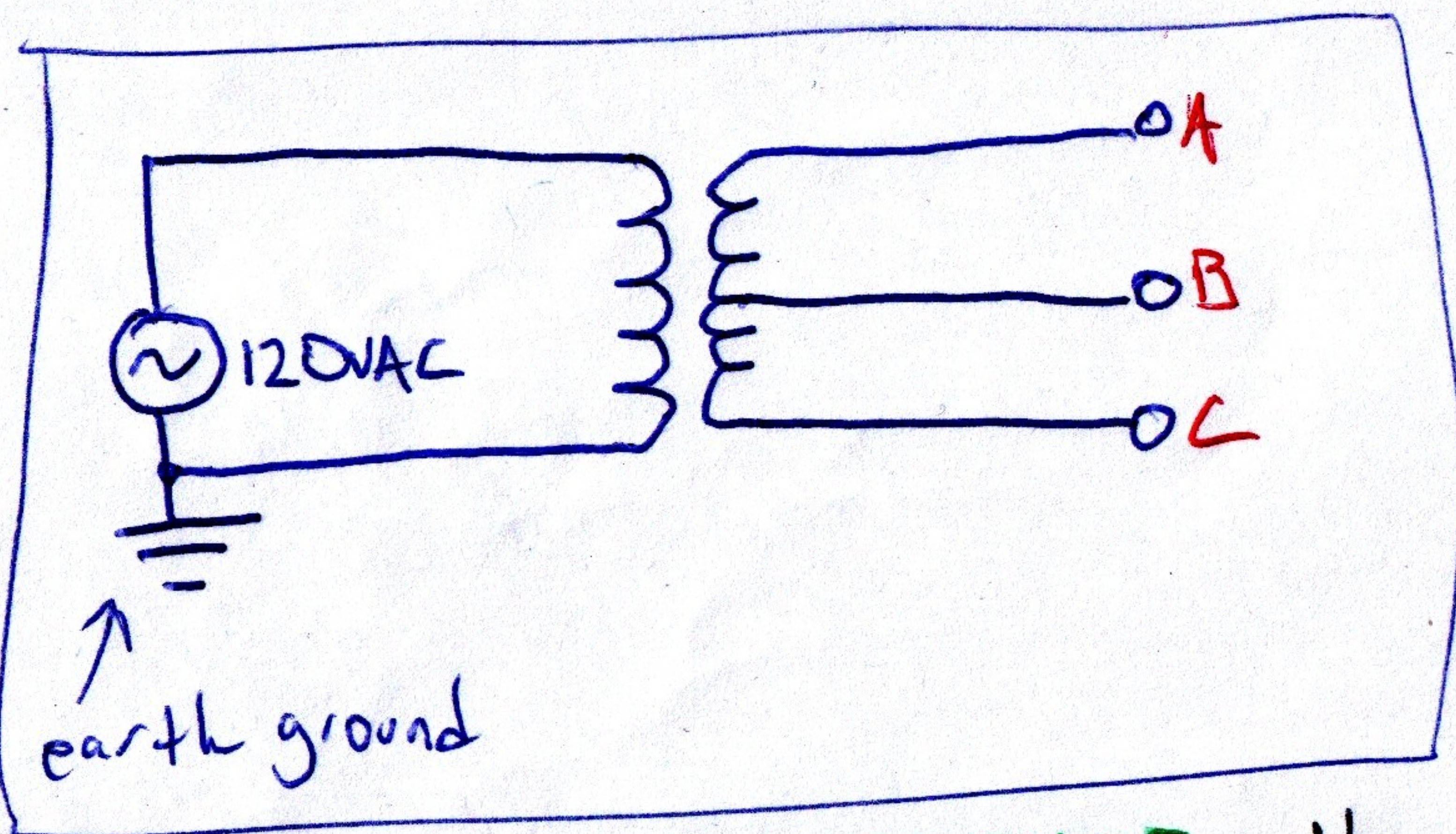


First, a quick note about the lab transformers:



The rack-mounted transformers don't have a ground connection!



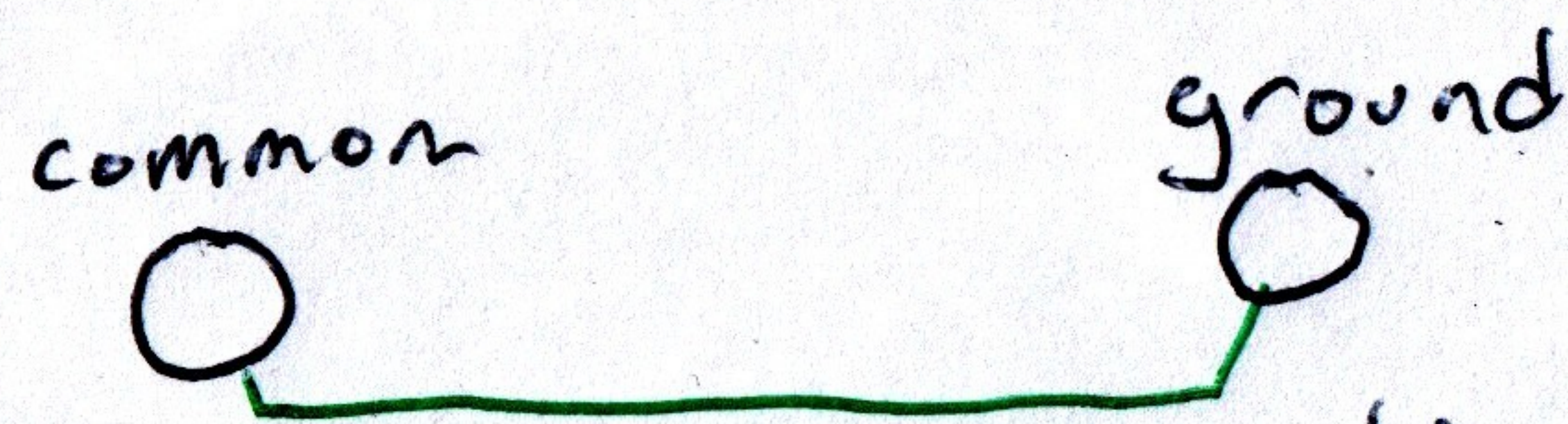
In order to **REFERENCE** the AC voltages on **A**, **B** and **C** to ground, you can connect one of them to ground in your circuits.

But only one!!

This is also true of the box-type transformers, they just have that ground terminal for convenience.

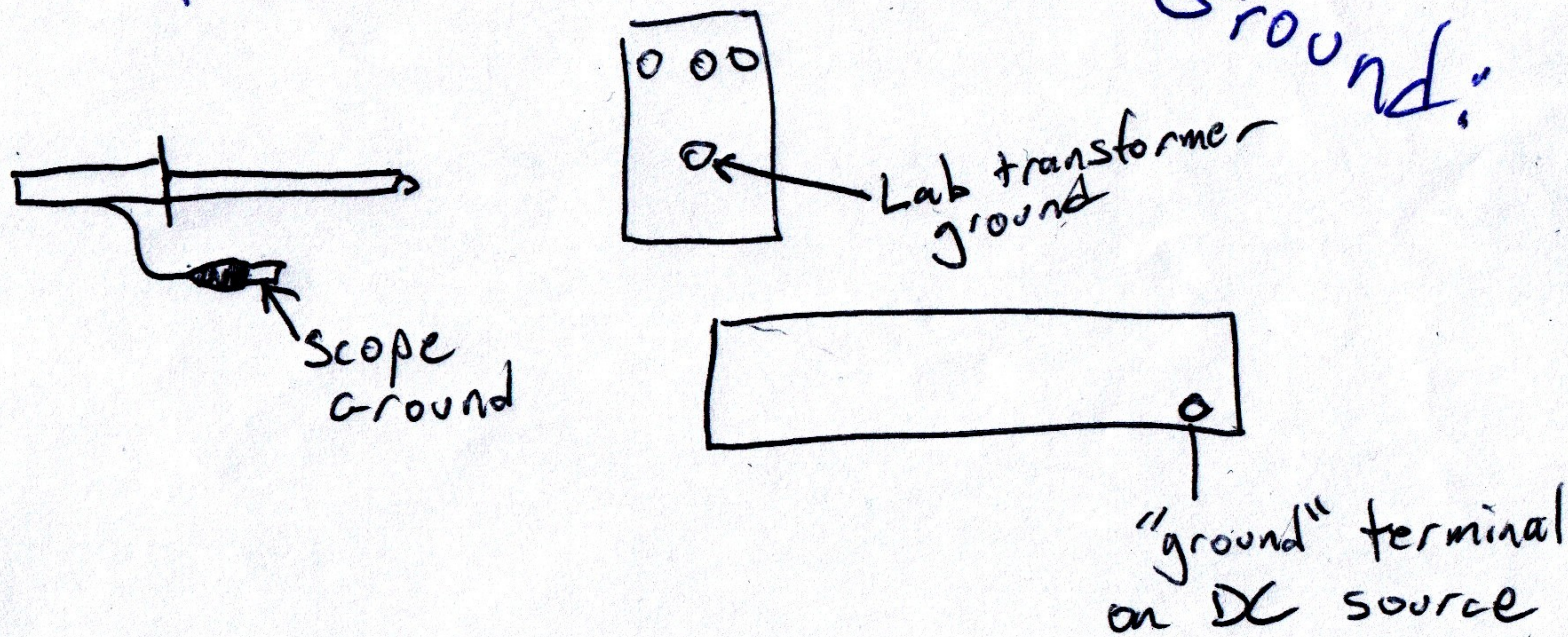
Also, briefly, about the DC supply.

The "common" and "ground" terminals are different!



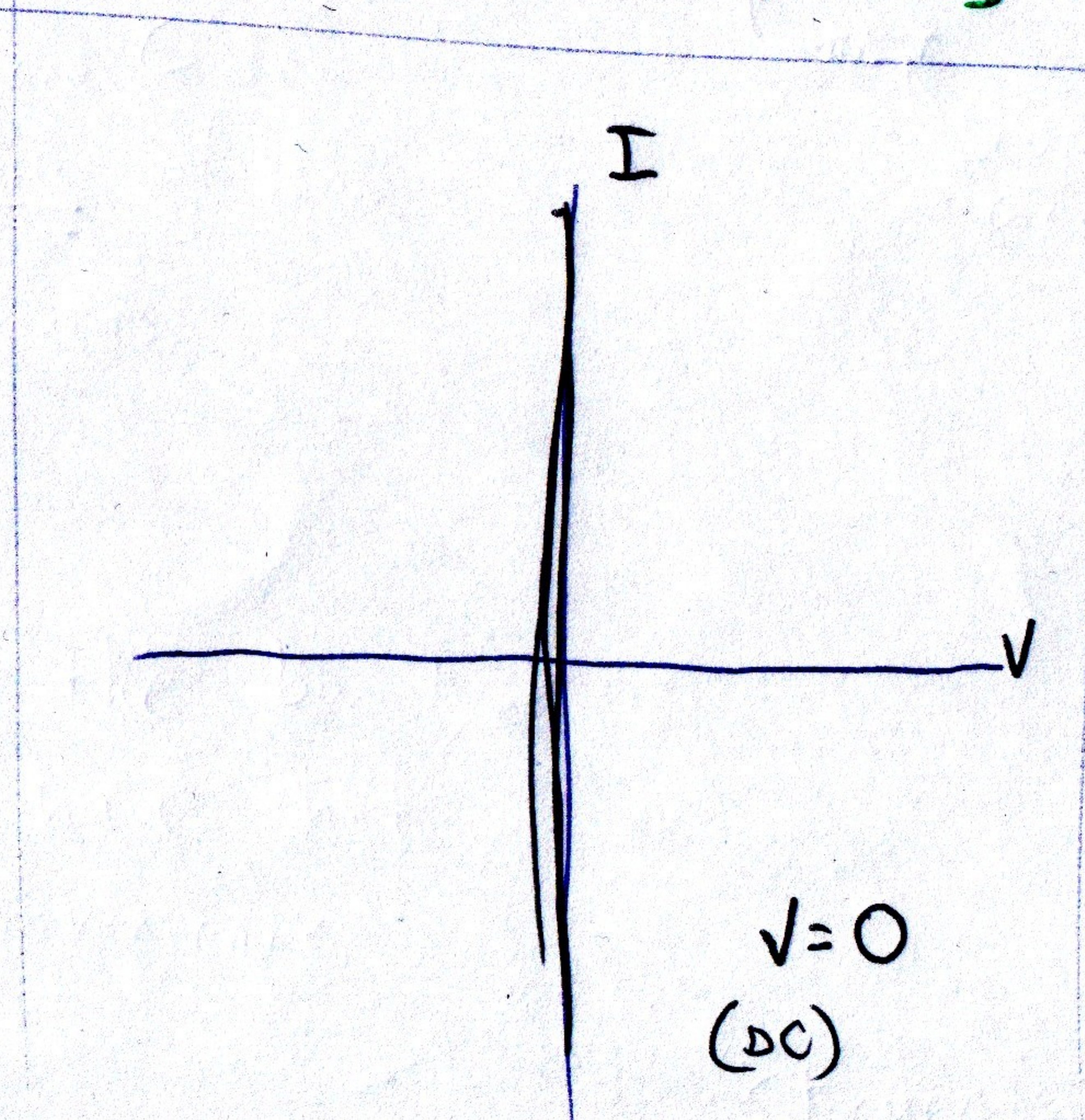
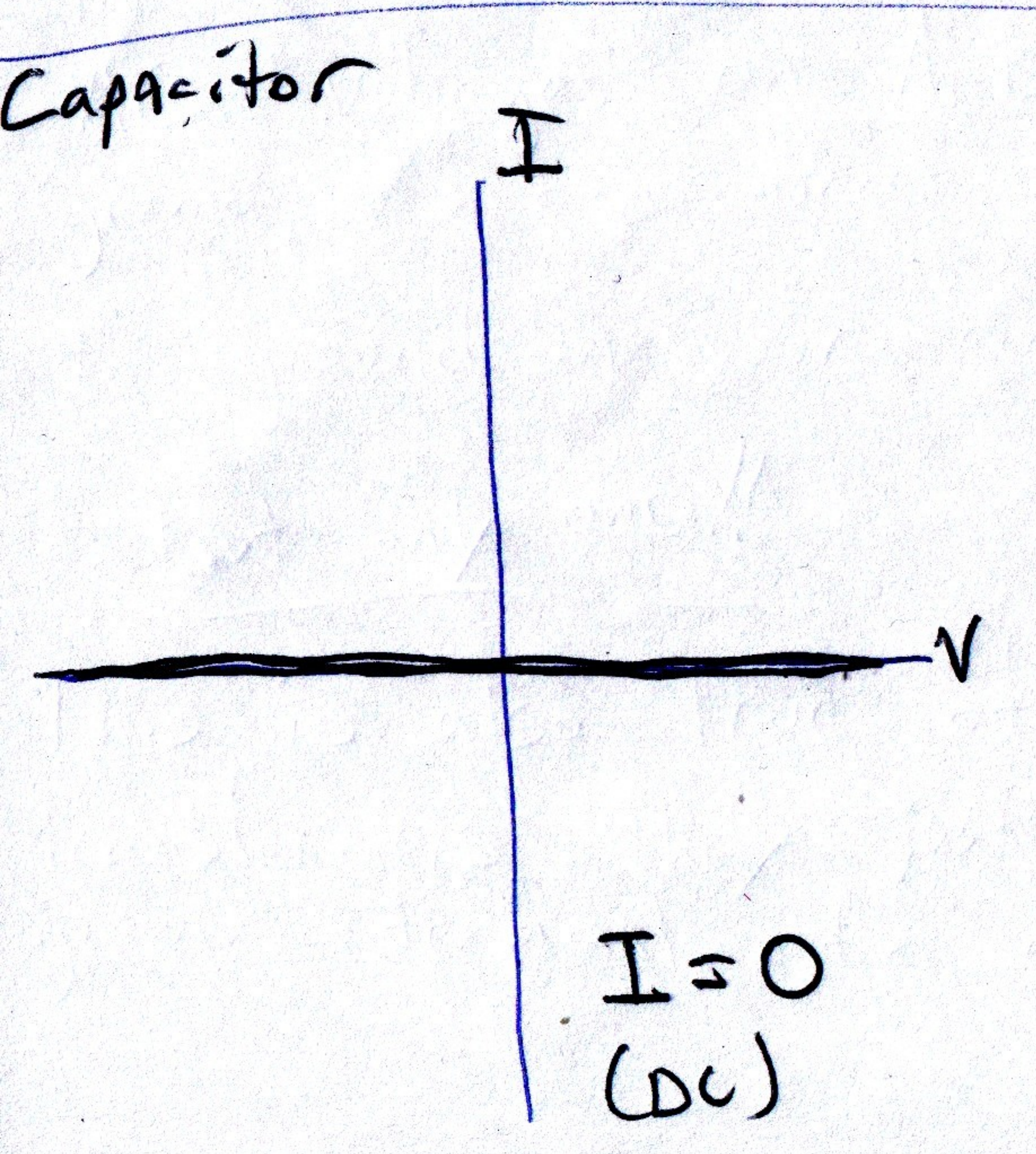
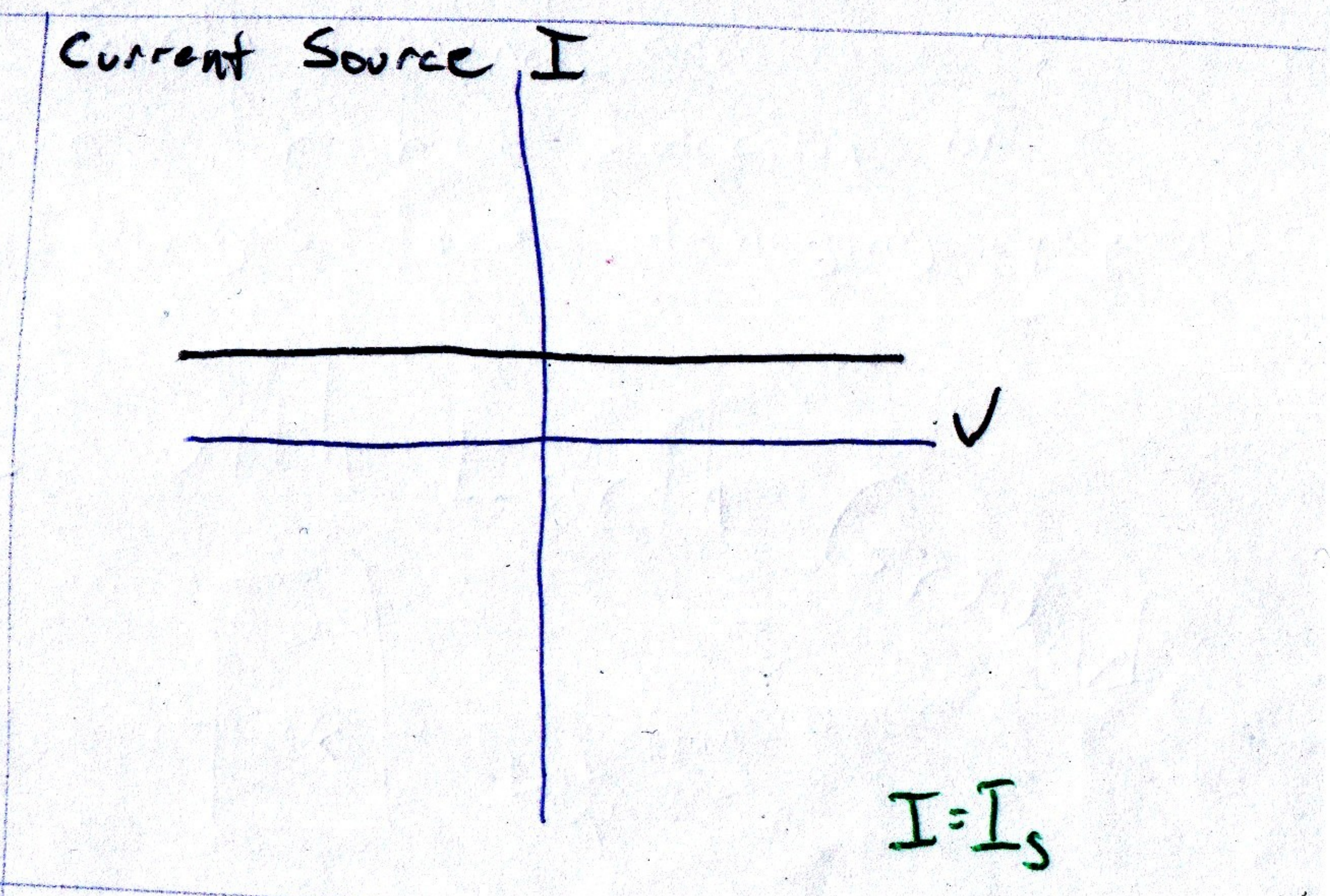
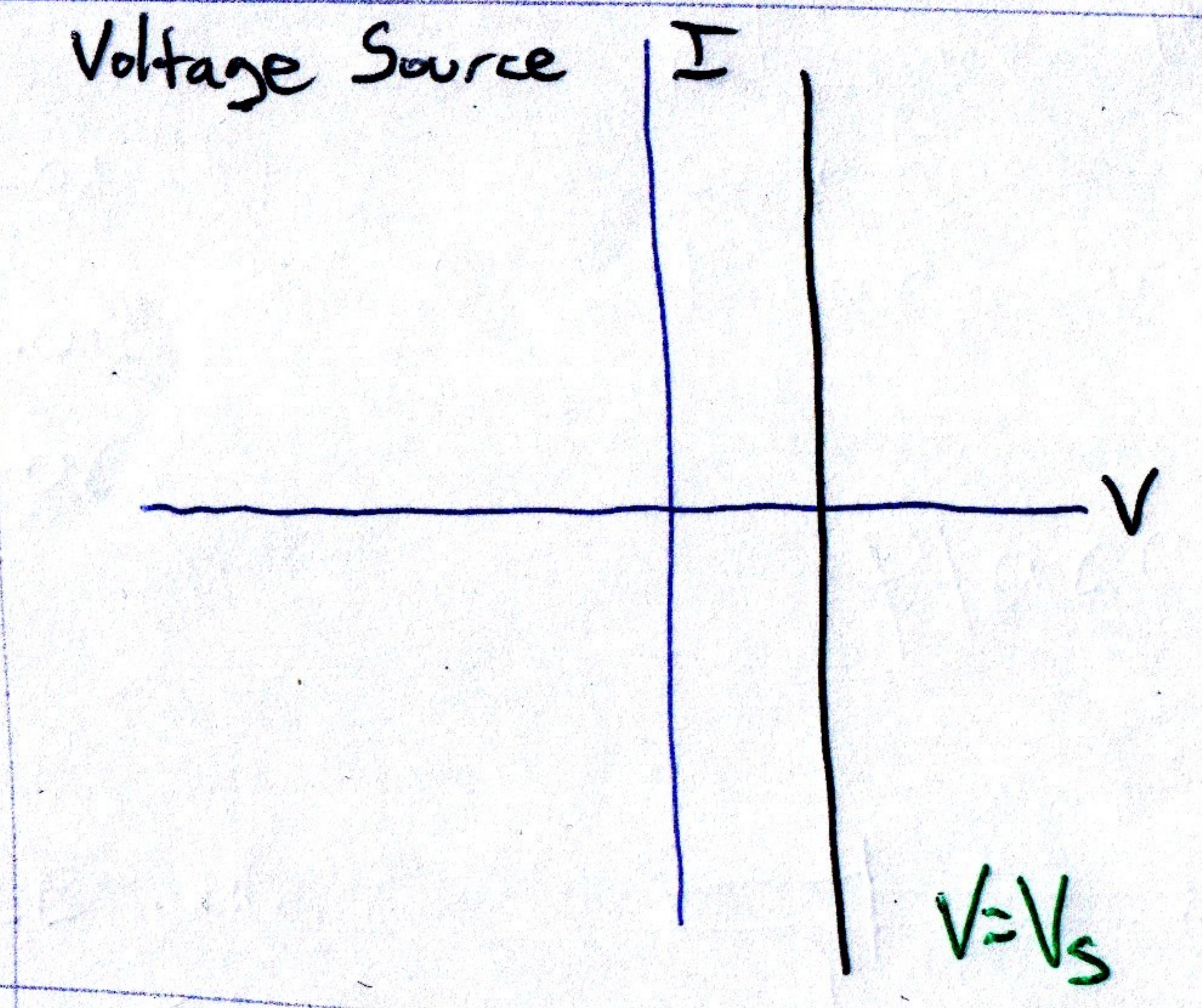
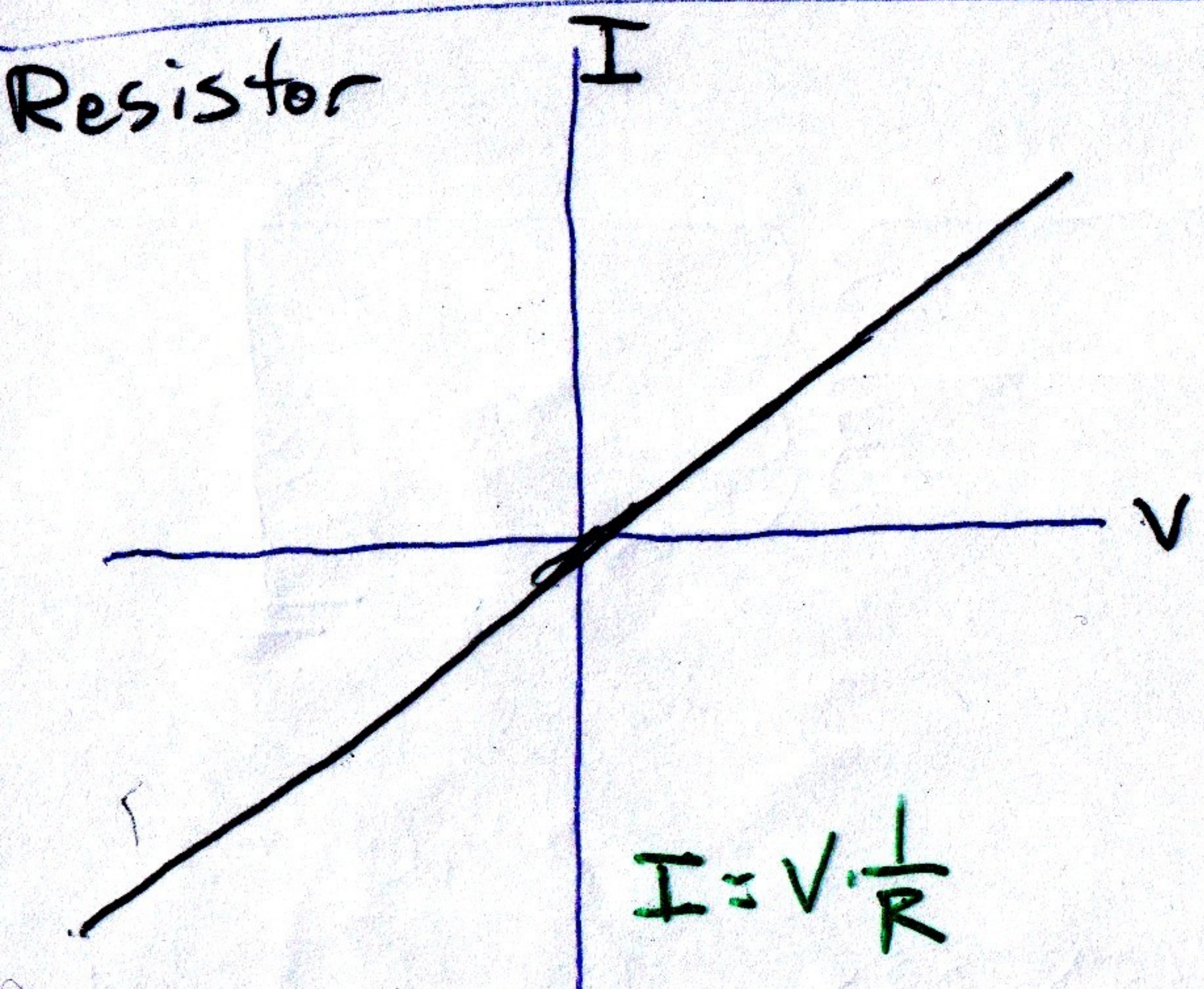
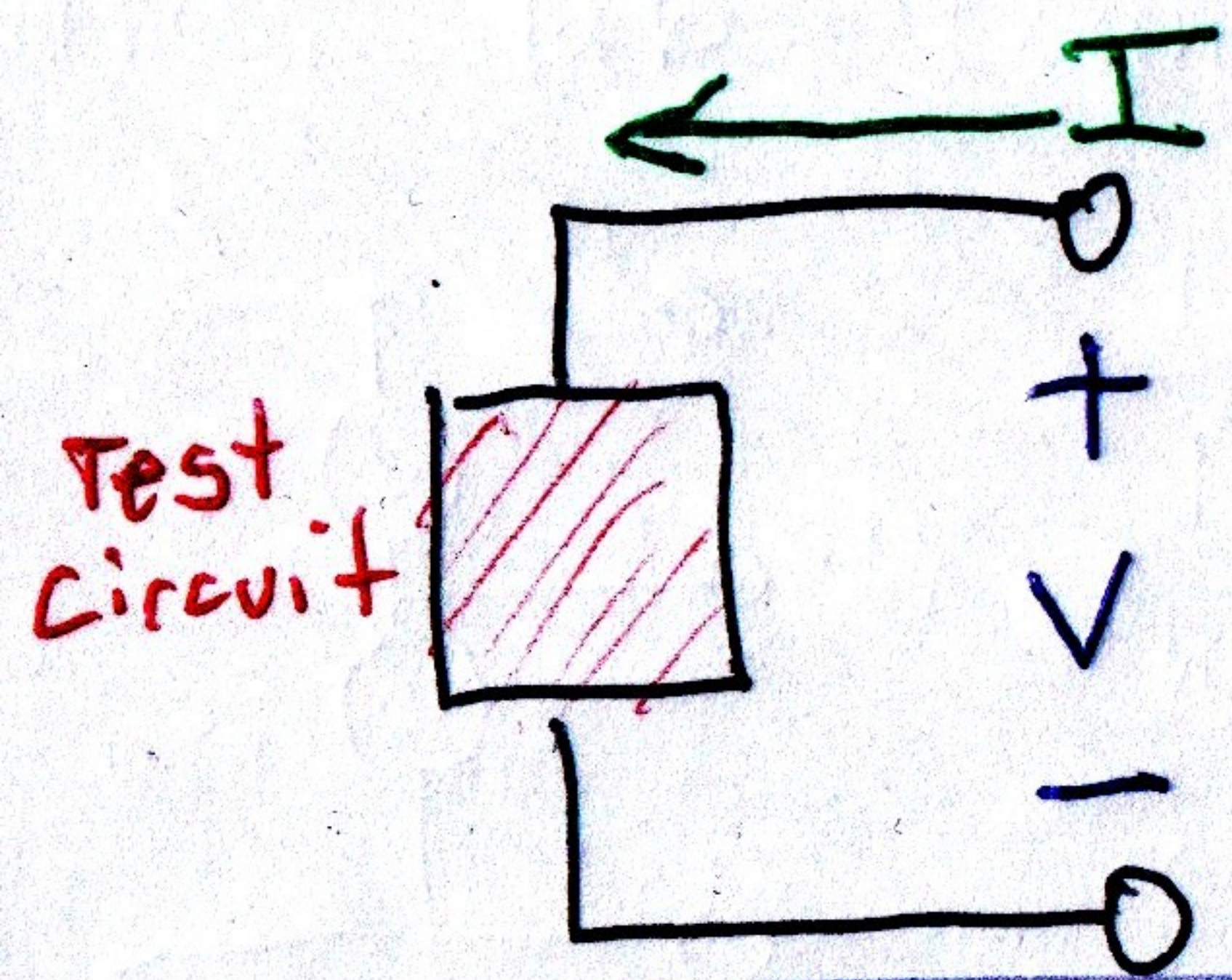
It's possible to build a circuit with no reference to Earth Ground, and this is sometimes done for noise protection or to keep large voltages from damaging equipment.

Places with Earth Ground:



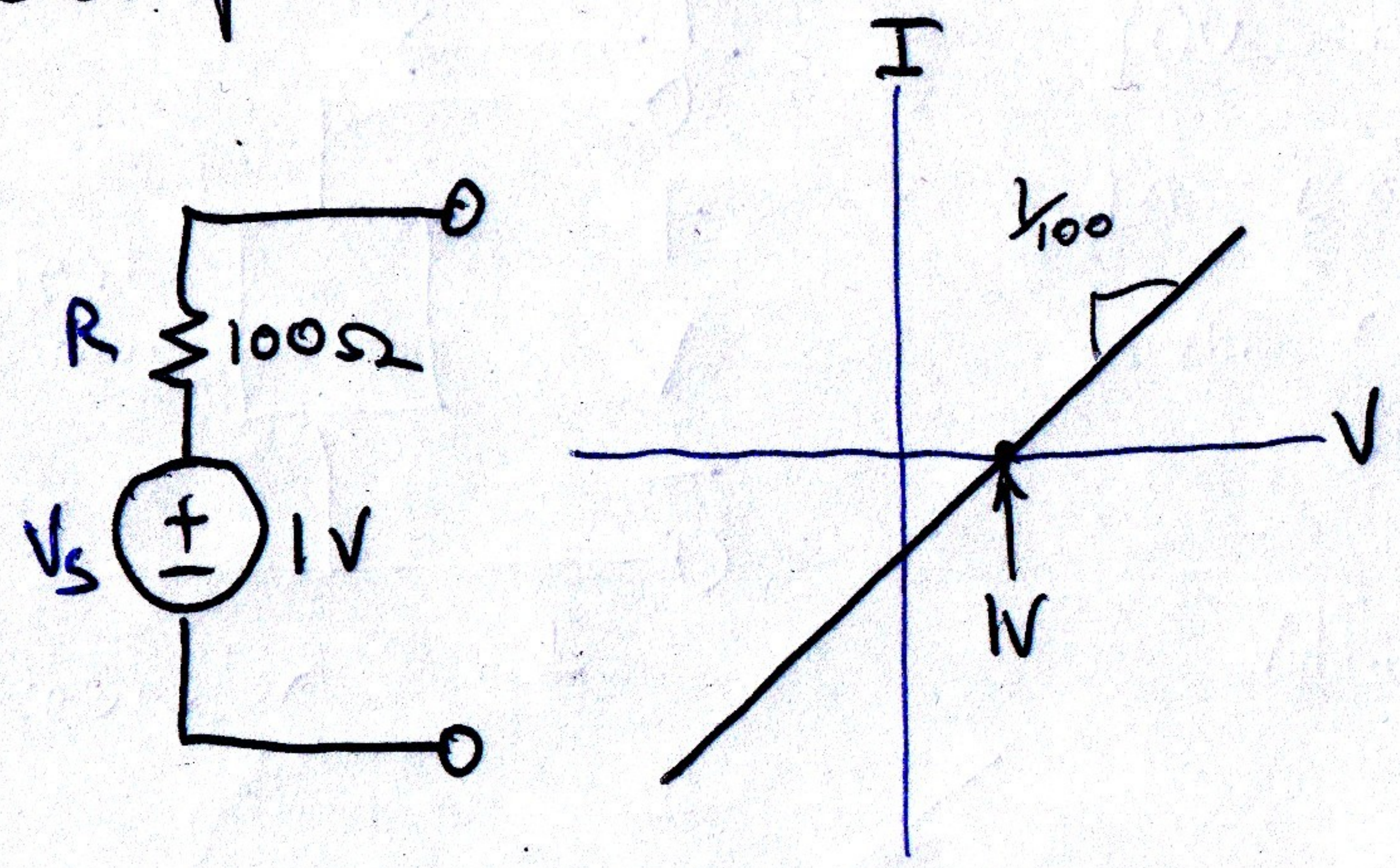
I-V Curves (2-terminal)

You might not have spent long on this in earlier classes, because all linear elements have **really boring** I-V curves!



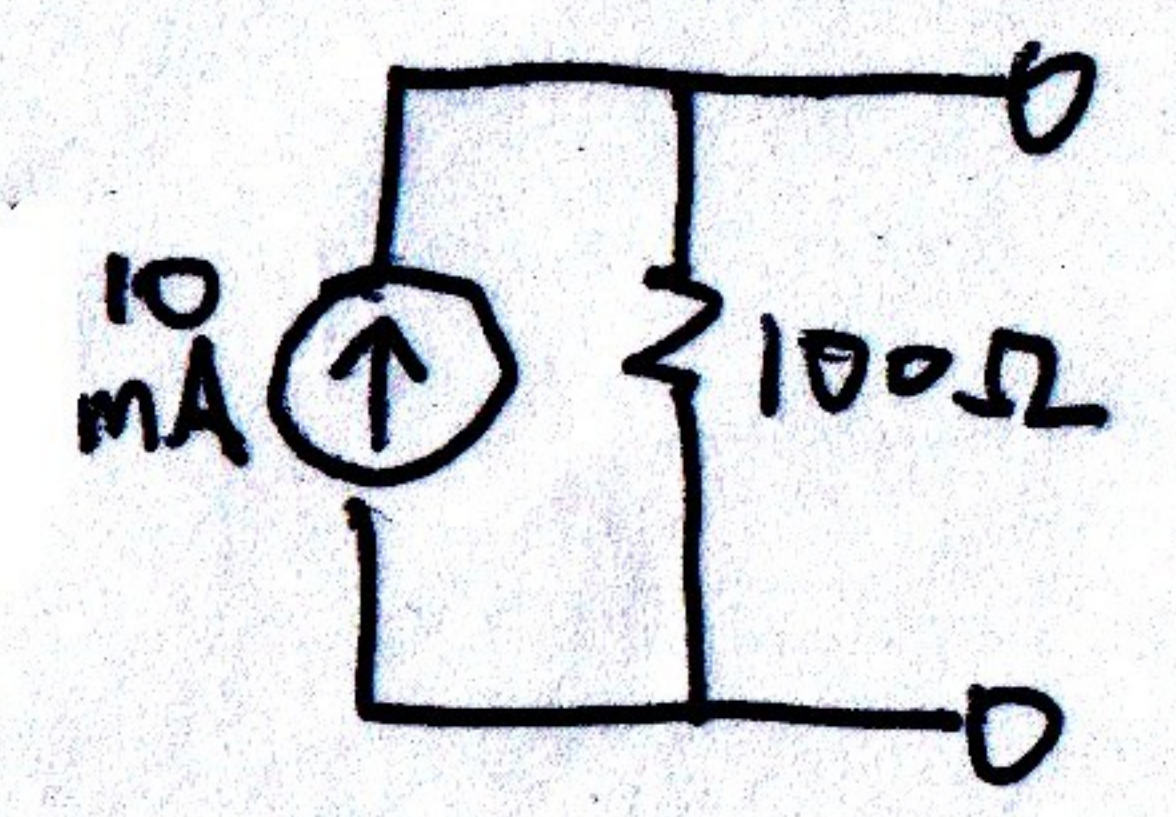
Note, L and C I-V curves tell you almost nothing about them, which is why you didn't use them for RLC circuit analysis!

Next, let's look at a compound circuit:



Note: R gives you the **SLOPE**
 V_s gives you the **X-intercept**
 AKA Open-Circuit Voltage

Also notice, the Norton equivalent is the same line



All Linear devices have had Straight Lines as their IV "curves". Lots of things don't:

- Diodes
- Zener Diodes
- Transistors
- LEDs
- Lightbulbs
- etc

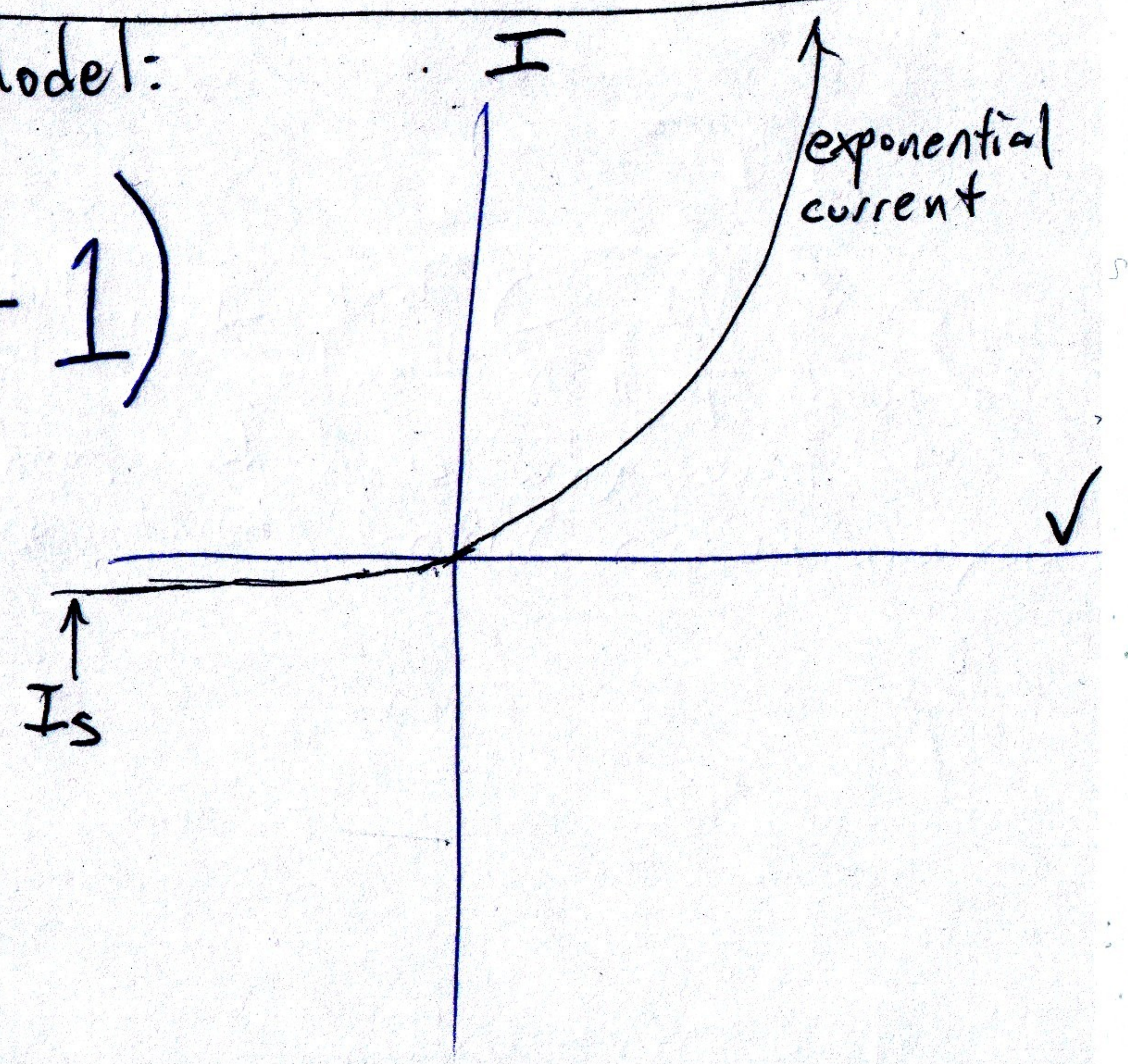
"All materials are ohmic"

↓
 "All homogeneous materials are ohmic if voltages are not excessive."

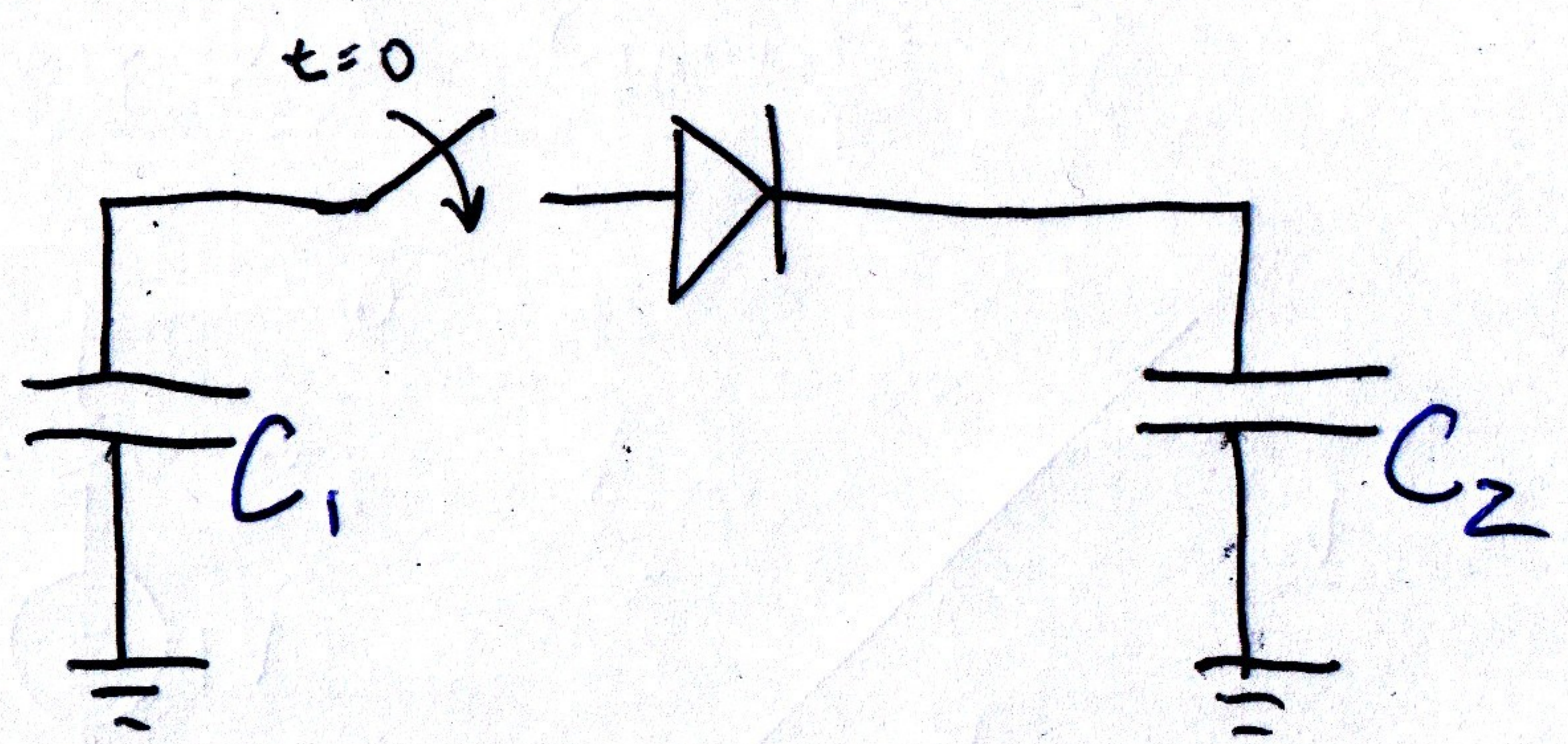
Nonlinear devices use inhomogeneous materials to achieve non-ohmic behaviors.

"Full" Diode Model:

$$I = I_s (e^{V/V_{th}} - 1)$$

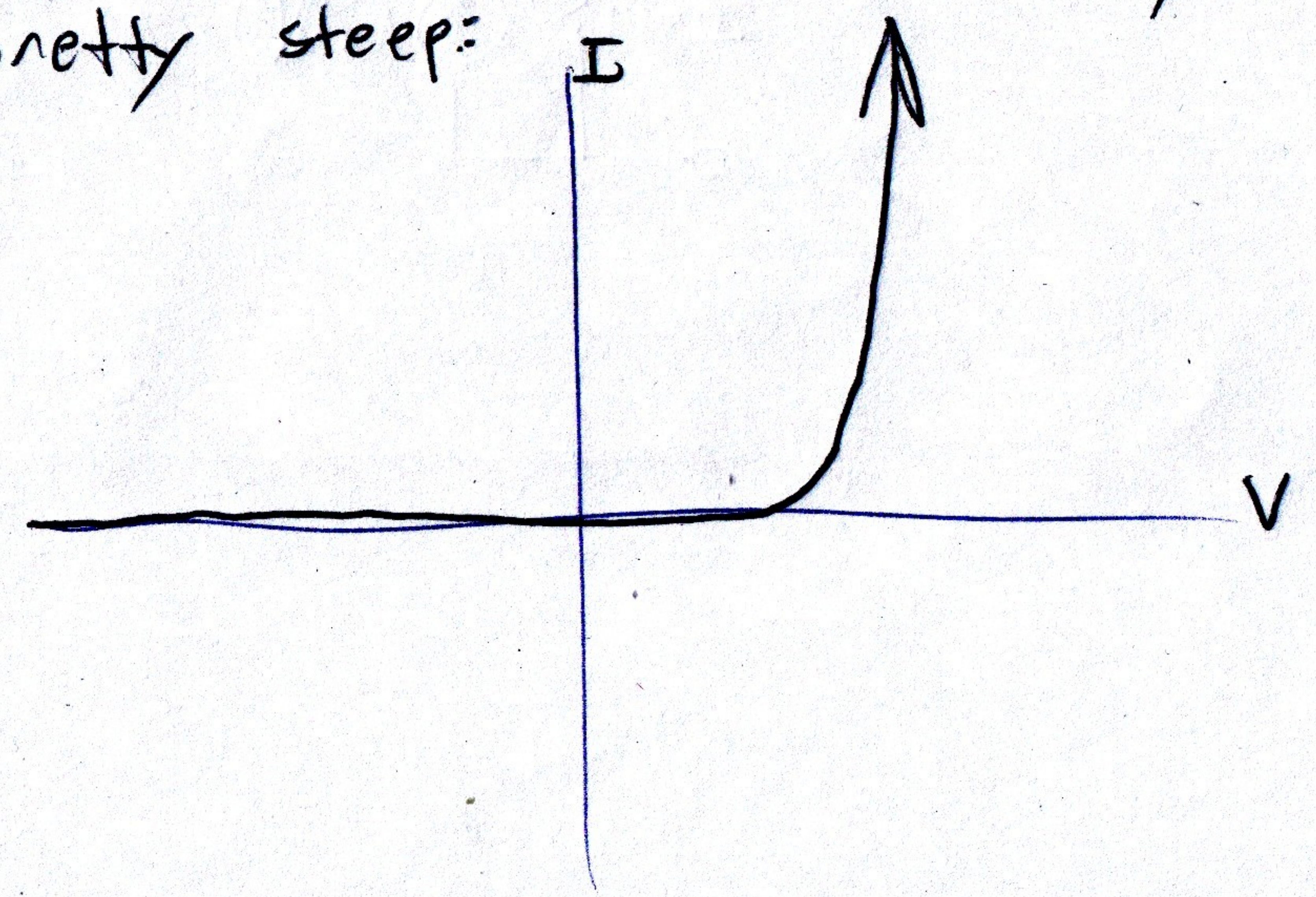


Super-Brief Example!

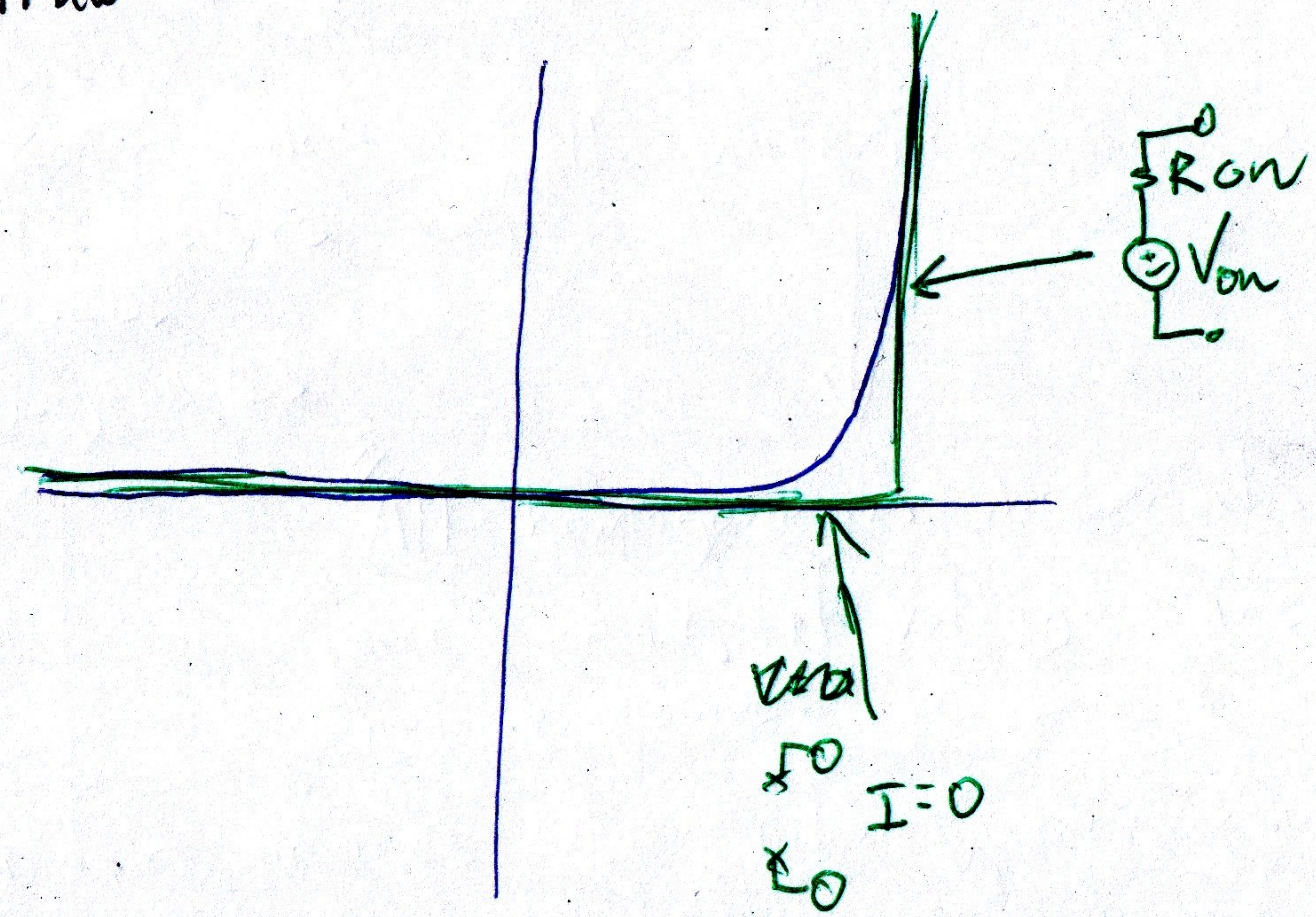


- ★ If C_1 has a higher voltage, C_1 and C_2 will quickly move to equilibrium.
- ★ If C_2 has a higher voltage, the same thing happens, just slowly!

Rather than set up a computer simulation, we usually just simplify the model. Exponentials usually look pretty steep:

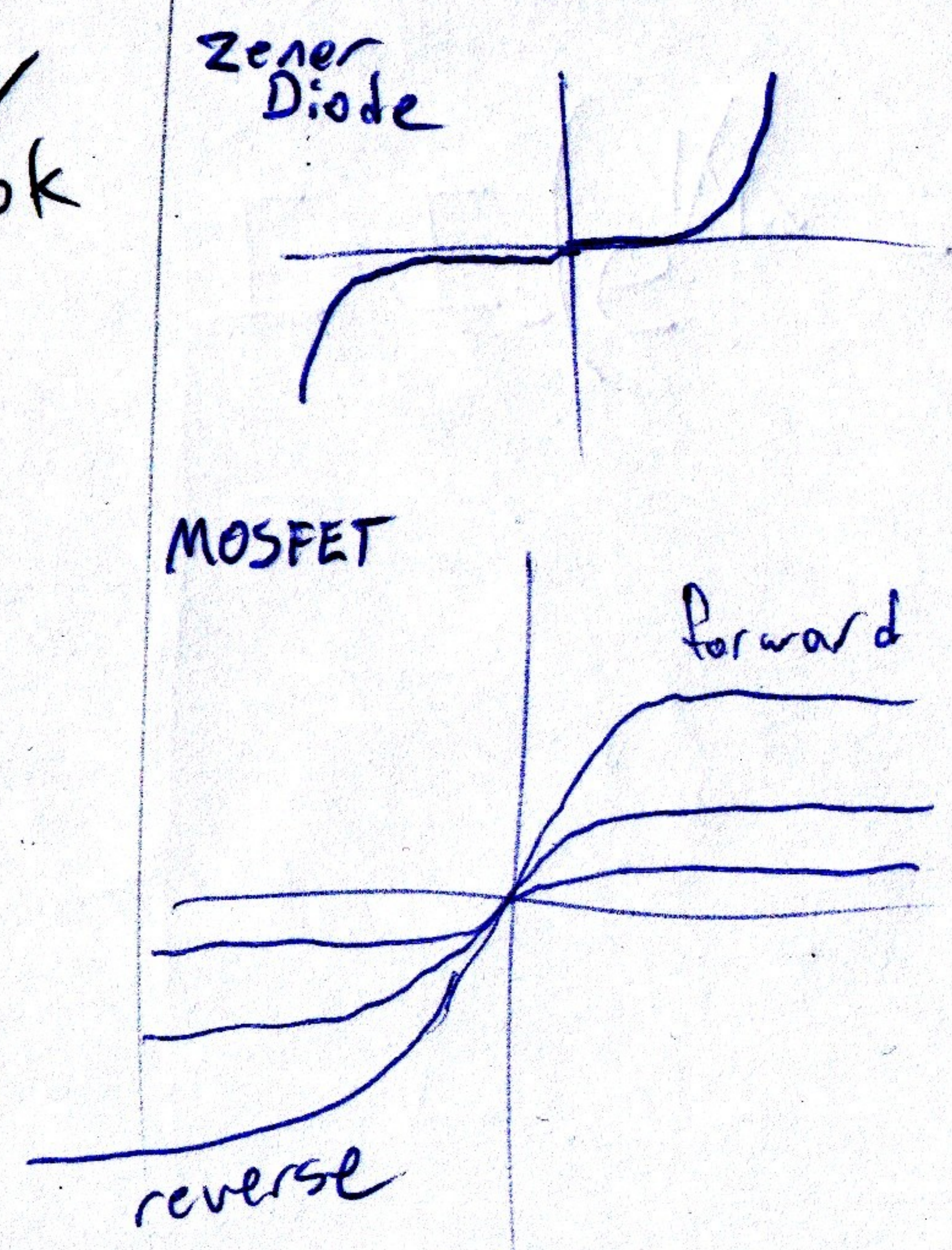


So we usually simplify and just draw a curve that's easier to think with:



(This will be a major theme in EE331)

-REAL-



-MODEL-

