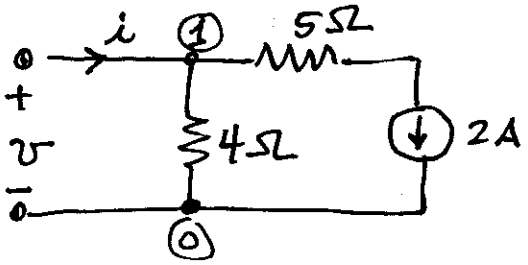
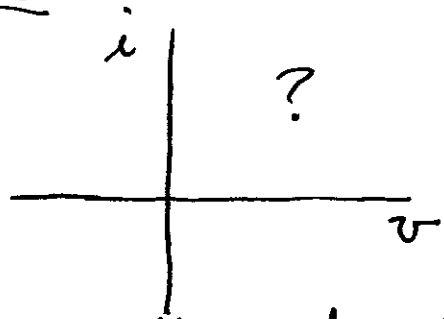
ECE 211 - Fall 2000

Exercise set E2 - selected solutions

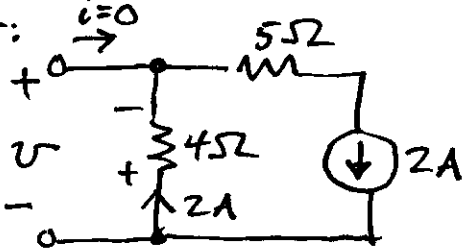
E 2.8 (e)





Since this is a linear circuit (no non-linear elements) we know that the i-v graph will be a straight line. If we can locate 2 points on that line, we can construct the i-v graph.

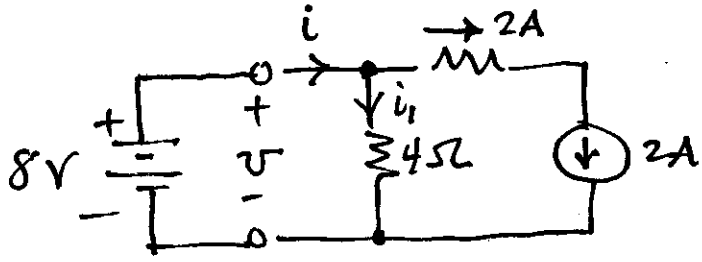
For the first point, suppose that $i = 0$ (no current flowing into node (1). Then the 2A constant current source causes a 2A current to flow up through the 4Ω resistor:



By Ohm's Law, $v = IR = (-2)(4) = -8$ V

so our first point on the line is $(i=0,\ v=-8)$

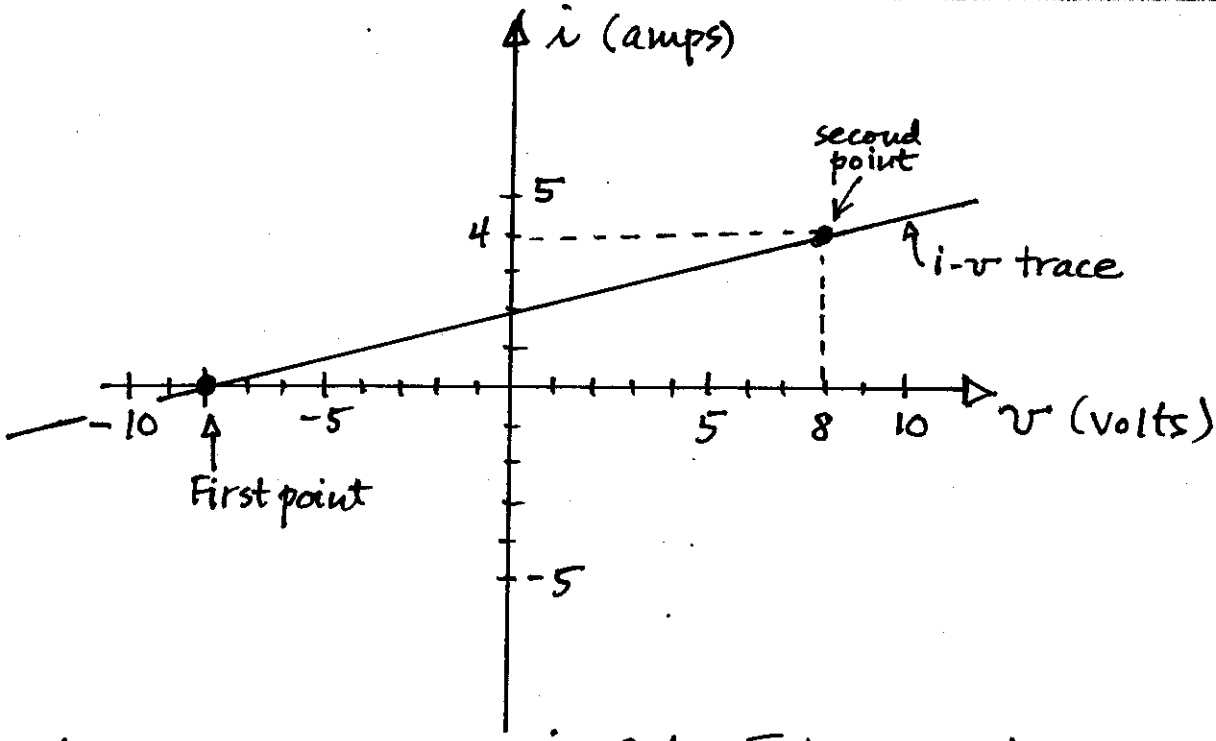
To get another point, imagine that we apply some voltage, e.g. $v = +8$ Volts to the circuit:



By ohm's law,
$v = +8 = i_1 \times 4 \Rightarrow i_1 = 2$ A

By KCL,
$i = i_1 + 2 = 2 + 2 = 4$ A

Thus the second point on the line is $(i=4,\ v=+8)$



Note that when $v=0$, $i=2\,A$. This means that $v=0$ indicates a <u>short circuit</u> across the input, so all the 2 A from the constant current source flows through the input.