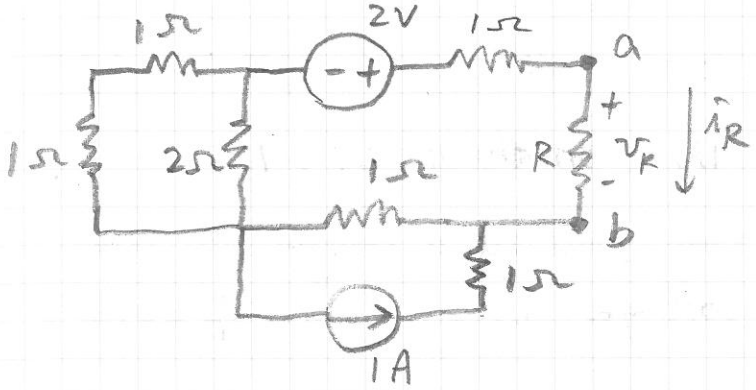
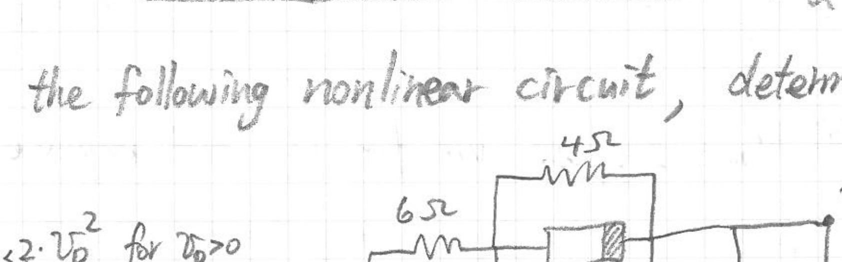
Some exercise problems since $P_{32}$:

A. Use Norton's Theorem to find $i_R$ and $v_R$ for ① $R=2$ and ② $R=4$

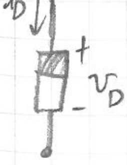



B. Following A, rather than using Norton's Theorem, directly apply superposition to find $i_R$ for $R=2$.

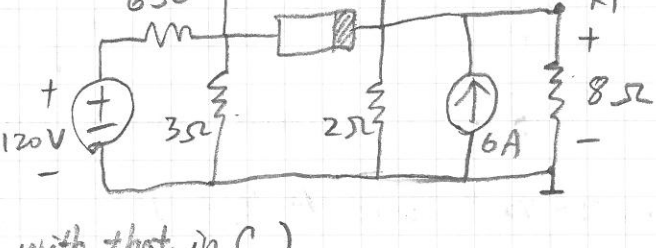
C. Determine the Norton equivalent at terminals a, b and at terminals c, d, for the following circuit:




D. For the following nonlinear circuit, determine $v_{R_1}$.




$$i_D = \begin{cases} 2 \cdot v_D^2 & \text{for } v_D > 0 \\ 0 & \text{otherwise} \end{cases}$$

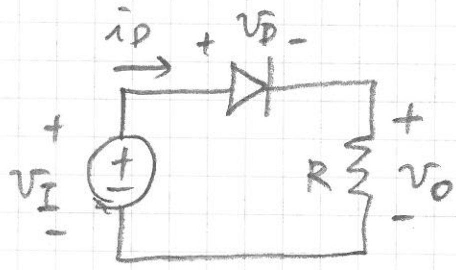


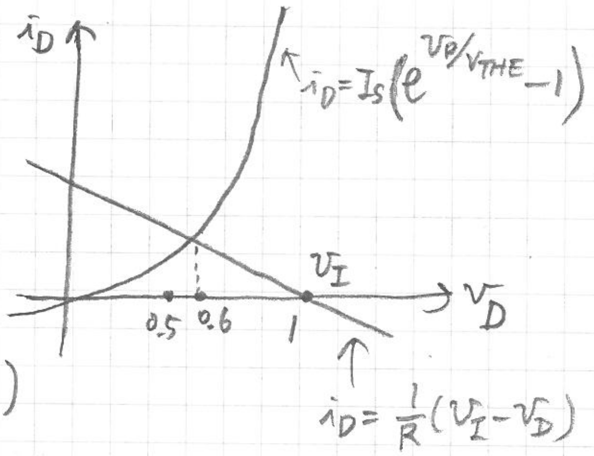

( hint: compare this with that in C. )

P42 E. For the following nonlinear circuit, with some initial analysis of its $i_D$ - $v_D$ relation at hand, try to answer three questions:

① if for some need we changed the input voltage $v_I$, so that $v_I > 1$, would that lead to a change to the output voltage $v_O > 0.4$ or $v_O < 0.4$?

② Now, suppose we operate the circuit at region $v_I \gg 1$. What can we say about $v_O$?





$i_D = I_S(e^{v_D/V_{THE}} - 1)$

③ Now, suppose we fix $v_I$ but replace the linear resistor by a very heavy load, such that $R \gg 1$. What would $i_D$ become?

Answers to Problems A, B, C, D:

A. ① $i_R = \frac{1}{5}A$, $V_R = \frac{2}{5}V$ ② $i_R = \frac{1}{7}A$, $V_R = \frac{4}{7}V$ B. same as A.

C. $R_{tab} = 2\Omega$, $i_{scab} = 1\,A$; $R_{tcd} = \frac{3}{2}\Omega$, $i_{sccd} = \frac{38}{3}A$

D. 16 V ※