

ECE 320 - Homework #3

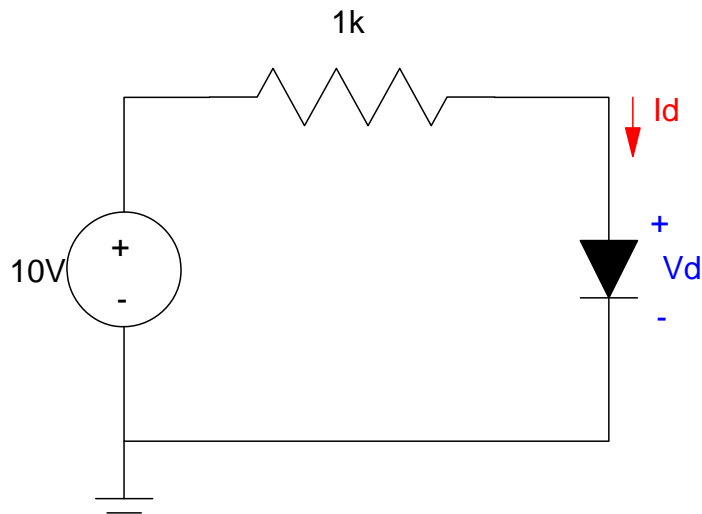
Diode VI Characteristics, Ideal Diode, LEDs. Due Monday, January 29th, 2018

Diode VI Characteristics

Assume the VI characteristics for a diode are:

$$V_d = 0.052 \cdot \ln(10^8 I_d + 1) \qquad I_d = 10^{-8} \left(\exp\left(\frac{V_d}{0.052}\right) - 1 \right)$$

- 1) Write the voltage node equations for the following circuit using the nonlinear diode equations (above). Solve these nonlinear equations to find V_d and I_d .
- 2) Draw the load-line for this diode circuit. Solve for V_d and I_d using load-line analysis.
- 3) Assume an ideal silicon diode. Compute V_d and I_d .
- 4) Check your answer in PartSim using a 1004 Fairchild diode.



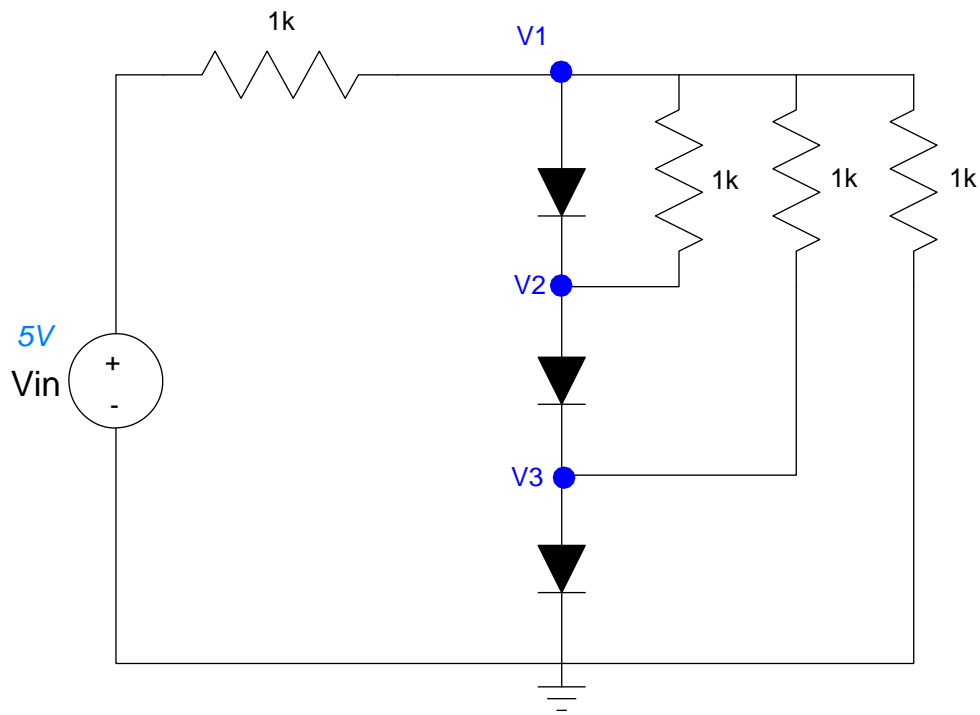
Problem 1-4

Problem 5-8) For the following diode circuit with $V_{in} = +5V$

- 5) Write the voltage node equations using the nonlinear model for the diodes.
- 6) Solve for the node voltages using Matlab (or similar program)
- 7) Assume ideal silicon diodes. Solve for V_1 , V_2 , V_3
- 8) Check your answers in PartSim (or similar program)

Lab:

- 9) Build this diode circuit below and check your calculations



Problem 5-9