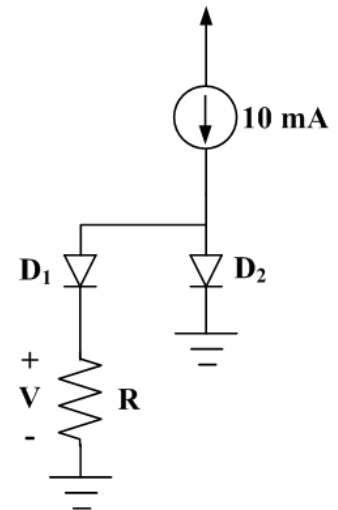
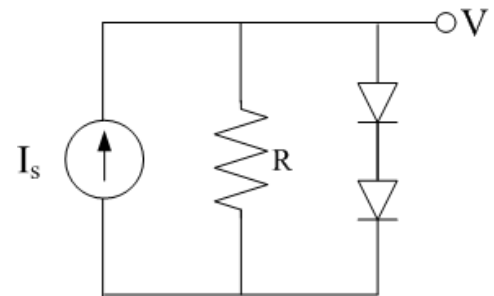


# Problem Set #6

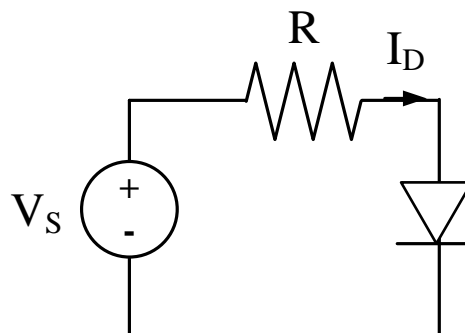
1. Consider the following circuit. The diodes are identical and operate in the forward bias region at room temperature. Find the value of the resistor,  $R$ , such that the voltage drop,  $V$  is 80mV.



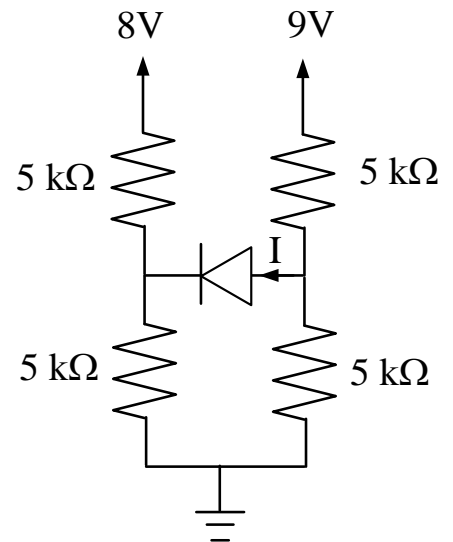
2. Consider the following circuit. The diodes are identical and have a current of 1mA for a voltage of 0.7V. The source current is 100mA. Design the resistor,  $R$ , such that the voltage,  $V$  is 1.6V.



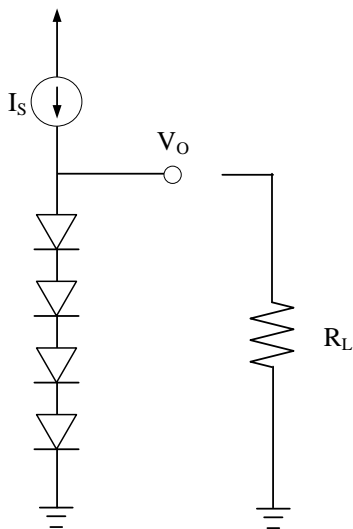
3. Consider the following circuit where the voltage source is 1V and the resistor is  $200\Omega$ . The diode is known to have 1mA at 0.7V.
  - a. What is the current,  $I$  assuming an ideal diode?
  - b. What is the current,  $I$  assuming a 0.75 constant drop model?
  - c. What is the current,  $I$  using the iterative process using the exponential model?



4. Consider the following circuit. Find the current  $I$  using (a) the ideal model and (b) using a  $0.7V$  constant drop model of the diode. Hint! Use Thevenin equivalent circuits to simplify the circuit.



5. Consider the following circuit. The diodes are identical with a saturation current of  $1 \times 10^{-16} A$ . What should the current  $I_S$  be to obtain an output voltage of  $2.8V$ ? Suppose a load resistor is connected at the output and draws  $1mA$  of current from the diodes. What is the change in the output voltage



6. Consider the following circuit, which contains a  $9.1 V$  zener diode. It is known that when the zener voltage is  $9.1V$ , the zener current is  $3mA$ . The incremental zener resistance is  $25\Omega$ . Find the resistor  $R$ , if the zener current is  $5mA$ .

