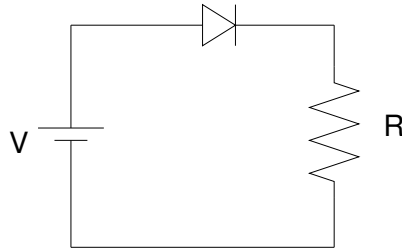


Physics 536 - Assignment #5

1. The reverse saturation current for a silicon pn -junction at room temperature (293 K) is $I_0 = 10^{-9}$ A. If the diode carries a forward current of 100 mA at room temperature, calculate the reverse saturation current and the forward current if the temperature is raised by 50° C and the potential difference across the diode remains constant. *Answer:* $I'_0 = 57$ nA, $I' = 384$ mA

2. (a) Following the example discussed in the lecture on February 19th, (page 100-102 of the lecture notes), use the iteration method to calculate the voltage drop across the diode, the current flowing through the following circuit and the power dissipated by the diode when $V = 5$ V, $R = 100\ \Omega$ and $I_0 = 10^{-12}$ A at a temperature is $T = 293$ K.



(b) What is the voltage drop across the diode, the current flowing through the diode and the power dissipated by the diode if the temperature increases by 50° C?

3. A 5 volt DC power supply has a fuse in series with its output that will blow if too much current is being drawn. Design a circuit that will light an LED to indicate when the fuse blows. Assume that the LED has a voltage drop of $V_D = 2$ V and will be operated with a forward current of 20 mA.