1. In a boron-doped (i.e. p-type) silicon layer with impurity concentration of $10^{16}/\text{cm}^3$, find the hole and electron concentration at 300K and 400K. \((B=5.4 \times 10^{31}, E_G=1.12, k=8.62 \times 10^{-5})\). From these calculations, explain how the temperature affects the diode.

2. For a forward biased diode:
   a. Explain what happens in the n-type & p-type material when temperature increases.
   b. Explain what happens in the n-type & p-type material when temperature decreases.
   c. Explain in your own words how \(I_s\) is created.
      i. What happens to this current when the temperature is increased?
      ii. What happens to this current when the temperature is decreased?
   d. Explain in your own words how \(I_D\) is created.
      i. What happens to this current when the temperature is increased?
      ii. What happens to this current when the temperature is decreased?

3. Exercise D3.16 (do not need to find the junction area just the resistor \(R\)). \(\text{Note also that } V_{D0} \text{ will not be } 0.7V\).

4. Exercise 3.17, D3.18,