

**Problem Set #1**

Assigned: September 8, 2000  
Due: September 15, 2000 at recitation

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**Reading:** Chapter 2 Howe & Sodini

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PLEASE WRITE YOUR RECITATION SESSION TIME ON YOUR PROBLEM SET SOLUTION

- Problem 1** [10 points] Problem E2.1 of Howe and Sodini  
**Problem 2** [10 points] Problem E2.4 of Howe and Sodini  
**Problem 3** [10 points] Problem E2.5 of Howe and Sodini  
**Problem 4** [10 points] Problem E2.6 of Howe and Sodini  
**Problem 5** [10 points] Problem E2.7 of Howe and Sodini  
**Problem 6** [10 points] Problem P2.2 of Howe and Sodini  
**Problem 7** [20 points] Problem P2.4 of Howe and Sodini

**Problem 8** [20 points]

A germanium (Ge) sample is doped with donors  $N_d = 5 \times 10^{15} \text{ cm}^{-3}$  and acceptors  $N_a = 10^{16} \text{ cm}^{-3}$ .

- Calculate  $n_o$  and  $p_o$  when the sample temperature is  $27^\circ\text{C}$ .
- Repeat (a) when the sample temperature is  $150^\circ\text{C}$ .
- Repeat (a) when the sample temperature is  $500^\circ\text{C}$ .

For Problems 8 use the graph below. 1% accuracy for your answers is sufficient.

