Lecture 6
Outline

Calculate n and p

- **Assumptions**: Non-degenerate; total ionization of dopants

- **Known**:
  \[ n_i \]
  \[ np = n_i^2 \]
  \[ p - n + N_p - N_A = 0 \]

  - n and p can be obtained by solving the two equations above

**Determination of \( E_F \)**

1) Exact position of \( E_i \)
2) Doped semiconductors

\[ n = n_i e^{(E_F - E_i)/kT} \]

Recall,
\[ p = n_i e^{(E_i - E_F)/kT} \]

Thus,

**Reading**: Chapter 2.5, 2.6

**Quiz # 2**: 10 minutes

**Homework #3**:
2.7 (hint: carrier distribution is given by \( g_c(E)f(E) \). For non-degenerate semiconductor,

\[ f(E) = \frac{1}{1 + e^{(E - E_F)/kT}} \approx e^{(E_F - E)/kT} \]

2.8 (hint: use the result of 2.7)
2.11
2.16
2.17
2.20 (hint: use Equation (2.13) and Table 2.1)
Due January 28.