Recitation 5
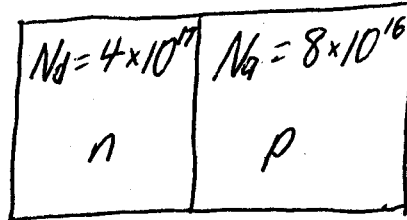## EE 3161 – Spring 2008

1) For the n-p junction drawn below, draw a band diagram. Find x_n and x_p. Also draw $\rho(x)$, $\xi(x)$, and $V(x)$ for thermal equilibrium and reverse bias. What is the maximum electric field in the junction for a reverse bias of 2V? If the doping of the n-region is increased to 10^{19} cm^{-3}, how does this affect the previously drawn diagrams?

$$N_d = 4 \times 10^{17} \quad N_a = 8 \times 10^{16}$$

$$n \quad\quad p$$

2) Consider the two diodes below. What is V_{bi} for each diode? If the intrinsic region of the p-i-n diode is very long compared to the depletion regions around it, can you estimate the maximum E-field without a full blown derivation (assume $V_a = 0V$)?

$$p \quad\quad n$$
$$N_a = 10^{17} \quad N_d = 10^{17}$$

$$p \quad\quad i \quad\quad n$$
$$N_a = 10^{17} \quad\quad N_d = 10^{17}$$

$$2\,\mu m$$