Recitation 6
EE 3161 – Spring 2008

1) A silicon p-n junction has a very highly doped p-region. In the n-region, $N_d = 10^{16}$ cm^{-3}. Assume T=300K.
   a) What is the critical E-field for breakdown?
   b) What is the reverse bias breakdown voltage?
   c) What is W at V_{br}?
   d) Sketch the E-field vs. x for applied voltages V=V_{br} and V= one volt beyond V_{br}. For the latter case, where in the diode is the excess voltage most likely to be dropped?
   e) What do you think would happen to the necessary breakdown field if the bandgap of the silicon diode was suddenly increased? Why?

2) For the silicon diode below, in forward bias, at what voltage does the current due to recombination in the depletion region equal the ideal case current? (Assume $\tau_p = \tau_n = 1\mu$s and T=300K. To simplify things, you may ignore the effect of the applied voltage on the depletion width.)