

ECE 278
Homework #7
Due Feb. 28, 2002 at the beginning of class

- 1) (30 pts.)
 - A) Derive a formula for the density of states $\rho(k)dk$ and $\rho(E)dE$ of electrons in 2 dimensions.
 - B) In 2 dimensions, find the relationship between the Fermi energy and the density.
- 2) (15 points) Show that a linear superposition of plane waves (lecture 12) is a solution to the Schrodinger equation. Do this by simple direct substitution.
- 3) (15 points) Show that the density of electrons n_i for an “intrinsic” semiconductor is equal to the formula stated in class by evaluating the integral and approximating the Fermi-Dirac distribution function by it’s high energy approximation.
- 4) (15 points) Find the Fermi level for N_a acceptors and N_d dopants, in thermal equilibrium.
- 5) (25 points) Verdeyen 11.4.

You will make the professor’s life easier if you staple this sheet to the front of or back of your homework.

1	2	3	4	5	Total
/30	/15	/15	/15	/25	/100