

**ECE 656: Fall 2009**  
**Lecture 4 Homework**

- 1) For parabolic energy bands, the 2D density of states is

$$D_{2D}(E) = \frac{m^*}{\pi \hbar^2} \Theta(E - \varepsilon_1)$$

Assume a non-parabolic band described by the so-called Kane dispersion,

$$E(k)[1 + \alpha E(k)] = \frac{\hbar^2 k^2}{2m^*(0)}$$

and

- 1a) derive the density of states
- 1b) use a figure to explain why it changes from the parabolic case
- 2) For a nonparabolic energy band described by the expression in 1), derive the corresponding  $M(E)$