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,

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

and derive the density of states