HW1 Problem 4; EECS 277C Nanotechnology

2 dimensions  

$$N_{k}dk = ?$$
Volume of circular shell  

$$=2\pi kdk/4$$
4 is for upper right quadrant  
Number of states in area=  
area x States/area  
States/area = 1 / (\pi/L)^{2}:  

$$N_{k}dk = (2\pi kdk/4) \cdot \left(\frac{1}{(\pi/L)^{2}}\right) \cdot 2 = L^{2} \frac{kdk}{\pi}$$

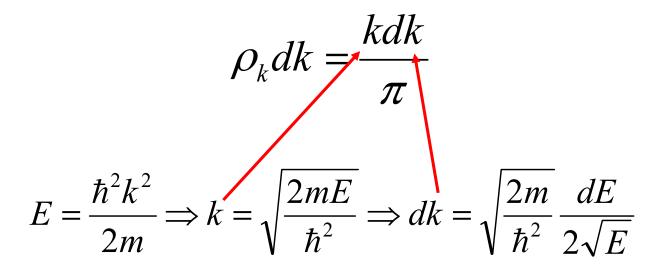
$$\rho_k dk \equiv \frac{N_k dk}{\text{area}} = \frac{k dk}{\pi}$$

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2 dimensions  $\rho(E)dE = ?$ 

We use:

 $\rho_k dk = \rho(E) dE$ 



 $dE = \frac{m}{2} dE$ 

$$\begin{aligned}
D = \frac{h^2}{2n} \left( \Xi \right)^2 H_1^2 H_1^2 H_2^2 \\
\Delta E = \frac{2^2}{2n} \left( \Xi \right)^2 \left[ \left( F_1 F_1^2 \right) - \left( E^2 + i H_2^2 \right) \right] \\
= \frac{2^2}{2n} \left( \Xi \right)^2 3 \\
\Delta E = \frac{1}{2} \left( \Xi \right)^2 3 \\
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$$4) \quad kT \sim \frac{e^2}{C}$$

$$=7 \quad C \sim \frac{e^2}{FT} \approx 1.610^{-9} F$$

$$\approx 10^{-18} F$$

5) 
$$(= \frac{6}{3} = \frac{5.85 \times 18^2 \text{ Fm} \text{ kd } 10^{-6} \text{ main}}{10 \text{ b}^{-1} \text{ m}}$$
  
 $= \frac{5.9 \times 10^{-17} \text{ F}}{5.9 \times 10^{-17} \text{ F}}$   
 $\frac{6^2}{2} = \frac{1.6 \text{ kc}^{-19}}{5.9 \times 10^{-17}} = 1.8 \text{ meV}$   
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