Physics 406

HW #6

(due 04/02)

(i) Omar (θ) Ch. 5, Ch. 6

(ii) Handout 6 "The Incredible Shrinking Circuit"

Problems:

1. θ Q.1
2. θ Q.4
3. θ Q.6
4. θ Q.9
5. Explain (qualitatively) the origin of effective mass in the model based on applying the central equation to a wave function in which only $G = 0, \frac{2\pi}{a}$ are allowed (in a 1D system), and expanding the momenta in the vicinity of BZB. What is the relation between effective mass and E(k) curvature? What is the effective mass for $k = 0$? Please use dispersion curves to demonstrate your reasoning.

6. ○ Pr. 2

7. ○ Pr. 5

8. ○ Pr. 11

9. Please describe, using a minimum of 4 sentences in your response, recent developments in the area of nanowires & nanoelectronics. Please base your answer on Handout 6.