EECS277C Spring 11 **Final Exam**

6/6/2011 4:00 to 6:00 pm
Professor Peter Burke

Name: Solutions

ID no.:

1	2	3	4	5	Total
/20	/20	/40	/10	/20	/100

Helpful constants for you:

$c = 3\ 10^{8}$ m/s
$e = 1.6\ 10^{-19}$ coulombs
$h = 6.63\ 10^{-34}$ J-s
$m = 9.1\ 10^{-31}$ kg
$k_B = 1.38\ 10^{-23}$ J/K
$h/e^2 = 25\ k\Omega$

(1) [20 pts.] In HW4, for the toy-model of graphene, we found the DOS to be

$$D(E) = \frac{E}{\pi\hbar^2 v_f^2}$$

Find the relationship between the 2d sheet density n and E_{Fermi}.

$$n = \int D(E)\,dE = \frac{1}{\pi\hbar^2 v_F^2} E_F^2$$

(2) [20 pts.] In HW4, for the toy-model of graphene nano-ribbons, we found the DOS to be

$$D(E) = \frac{2}{\pi v_f}$$

Find the relationship between the 1d linear density n and E_{Fermi}.

$$n = \int D(E)\,dE = E_F \frac{2}{\pi v_F}$$