**Physics 2170, Spring '95** **Homework #4**
**Due Wed, Feb. 15**

*Required reading for this week: F+T Chapter 2*
*(Optional: Beiser, Ch. 3.1-3.5)*

*Reminder- 1st midterm: Thur. evening, Feb. 16, 7:30-9 Muen E-131.*
*(Any possible conflicts* must *be discussed with me BEFORE Feb 10!)*

HW problems:

1. The wavelength of the $K_\alpha$ x-ray line for a certain element is 1.94 Angstroms. What is the element?

2. F+T 1-21

3. F+T 1-26

4a) F+T 2-5

b) Find the kinetic energy of an electron whose de Broglie wavelength is the same as that of a 200 keV x-ray.

5a) What are the phase and group velocities of the deBroglie waves of the electron in problem 4b?
Note: (*If* you cannot solve problem 4b, use a value of kinetic energy of the electron = 40 keV)

b) The phase velocity of ripples on a liquid surface is $\sqrt{\frac{2\pi S}{\lambda \rho}}$, where S is surface tension, $\rho$ is the density of the liquid, and $\lambda$ is (as usual) the wavelength of the ripples. Find the group velocity of the ripples. (Express you answer in terms of the phase velocity)