

**Homework 3**

Due Friday, Feb. 15- Noon, 2008

Drop Box #8 Everitt Basement

1. (a) Calculate the total number of electrons bombarding the target of an X-ray tube operated at 500 mA for 0.2 seconds.
- (b) Calculate the maximum energy and minimum wavelength for an X-ray beam generated at 150 kVp
- (c) Calculate the power of the tube operated at the voltage in b (how is that power compared to your regular light bulb at home?).
- (d) The X-ray average energy is 70keV. What is the average number of X-ray photons generated per each accelerated electron if the overall power conversion efficiency is 10%?
- (e) What is the de Broglie wavelength of the accelerated electron? (mass of the electron  $m=9.1 \times 10^{-31} \text{kg}$ )

(50 points)

2. Problem 1.1 in textbook (10 points)
3. Problem 1.3 in text (20 points)
4. Problem 1.8 in text (20 points)