PHYSICS 101A – HOMEWORK SET 3

Due in class Friday 10/31/08.

Reading: Tipler and Llewellyn, Chapter 3.

1.) Problem 3.8

2.) Problem 3.14. This problem works you through an important technique: transformation of variables for a differential distribution. This technique will show up later in 101A and B.

3.) Problem 3.21 (Answer: 394 Kelvin. Note that room temp is about 300K, and that water boils at about 373 K. Still, on an absolute scale, this is not such a bad approximation).

4.) Problem 3.22 (Answers: a) 3.42×10^{14} Hz; b) 1.77×10^{20} photons/s; c) 1.10×10^{13} photons/s)

5.) For the filament of Problem 3.22, approximate the power radiated for light in the frequency range between 6.00×10^{14} Hz and 6.10×10^{14} Hz.

6.) Problem 3.26 (Answers: a) 654 nm and 4.59×10^{14} Hz; b) 2.23 V; c) 1.20 V)

7.) Problem 3.42 (Answer: a) 2.24 eV)

8.) Problem 3.35 (Answer for a) 3.10 eV/c and 1.66×10^{-27} kg-m/s)

9.) Problem 3.36 (Answer: 19.3 degrees).

10.) Problem 3.49

11.) Problem 3.55. The idea behind the problem is good, but its presentation needs some work. Firstly, to clarify the problem, assume that the carbon nucleus has no internal energy before absorbing the photon. Secondly, to make the results more balanced, assume that the incident photon energy is 1500 MeV, NOT 15 MeV. You'll still be able to treat the kinematics of the carbon nucleus recoil non-relativistically, although you'll need to consider the change in mass of the nucleus associated with its change in internal energy. (We can't fault the text for using the value 15 MeV; a value much larger would in fact break up the carbon nucleus into fragments. We'll ignore this possibility, though). (Asnwer: a) 89 MeV and 1411 MeV; b) 1267 MeV)