**The Quantum Description of Electronic Materials**
**ECE/Mat 162A, Fall 2008**
**Homework 1**
**Due Tuesday, Oct 7th 2007, in Class**

1. Games of chance contain events which are ruled by statistics. Do such games violate the strict determination of individual events? Do they violate cause and effect?
2. An electron and a photon each have a wavelength of 2A. What are their A) momenta and B) total energies? C) Compare the kinetic energies of the electron and the photon.
3. Does a television emit XRays? (Old style television with an electron beam, not a plasma or liquid crystal television) Why? (Parents used to tell kids not to sit too close to the TV because of XRay emission).
4. What is the maximum photocurrent you can get from a solar cell on earth? (Solar radiation falls on the earth at a rate of 1.94 cal/$cm^2$-min on a surface normal to the incoming rays. Assume an average wavelength of 5500 A).
5. Determine the maximum wavelength shift in the Compton scattering of photons from protons.