Physics 2320: Spring 2007: Problem Set 5

1. a) In lecture we derived a distribution, $u_f(f)df$, for the energy density in cavity radiation as a function of frequency. If hf is the energy of a photon, modify this distribution to find a distribution $n_f df$ of photon density as a function of frequency for this system.

   b) Find the frequency for which this new distribution in (a) has a maximum, f_{peak}, and show that f_{peak}/T is a constant.

2. The sun radiates approximately as a black body or a cavity radiator at 5800 K.

   a) Find the frequency at which the energy density is maximum as a function of frequency.

   b) Find the wavelength at which the energy density is a maximum as a function of wavelength.

   c) Find the frequency at which the photon density is a maximum as a function of frequency.