1. Light of wavelength 500 nm is incident on a metal and electrons are emitted. The electrons have a range of energies from 0 to 0.68 eV.

   (a) Find the work function of the metal.
   (b) Find the threshold (cutoff) wavelength for the metal.
   (c) Why do some electrons have kinetic energies less than the maximum?
   (d) The maximum current observed is 2.5 nA and the light beam has a diameter of 4.0 mm. Find the intensity of the light in W/m$^2$. Assume that each photon results in an electron.

2. I send photons toward a material and look at photons that are scattered through an angle of 127°. Some of the scattered photons are seen with three times the wavelength of the original photons. Determine
   (a) the wavelength of the original photons
   (b) the energy of the original photons.
   (c) Some scattered photons have the same wavelength as the original photons, even though they are scattered through the same angle. Why?

3. Chapter 3 lists several interactions between electrons and photons—photoelectric effect, Compton effect, pair production, Bremsstrahlung. For each interaction tell whether it can occur in free space (vacuum) or if it needs to occur with the electron surrounded by material (i.e. a solid, liquid, or gas.)

4. Two slits are each 0.04 mm wide and have a center-to-center separation of 0.60 mm. On a screen located 2.5 m away interference fringes are seen separated by 0.75 cm. Find the wavelength of the light illuminating the slits.