em waves- intensity and radiation pressure

1. Consider a 5mW red HeNe laser (λ=632.8 nm). At a distance of 10 m from the exit of the laser, the spot size is about 2.5 cm in diameter. Determine:
   (a) The amplitude of $\vec{E}$ and $\vec{B}$.
   (b) The photon flux (number of photons/s per cm^2)

2. Most of the electromagnetic energy in the Universe is in the cosmic microwave background radiation, a remnant of the Big Bang. This radiation was discovered by A. Penzias and R. Wilson in 1965, by observations with a radio telescope. The radiation is electromagnetic waves with wavelengths around 1.1 mm. The energy density is 4.0×10^{-14} J/m^3. (This is 2.5×10^5 eV/m^3, or about half the rest energy of an electron in each cubic meter of the Universe.)
   (a) What is the RMS electric (in V/m) and magnetic field (in T) strength of the cosmic microwave background radiation?
   (b) How far from a 1000 W transmitter would you have to go to have the same field strength? Assume the power from the transmitter is isotropic.

3. The dust tail of a comet points away from the sun because of radiation pressure by sunlight. Estimate the order of magnitude of the force on a dust grain with linear dimension 1 μm at the radius of the Earth's orbit, where the intensity of sunlight is 1300 W/m^2. Compare the radiation force to the force of solar gravity on the grain assuming the grain has density 5 g/cm^3. Can the radiation affect significantly the orbit of the dust grain?