M98E.3—Magnetic Field of the Earth

Problem

The magnetic field of the Earth may be approximated as a magnetic dipole. The axis of the dipole does not coincide with the geographic North pole, but is inclined at angle $\Psi = 11°$.

a) Estimate the magnetic moment of the Earth, using the fact that the magnetic field is about 0.5 gauss at the equator.

b) Find the radiated power in Watts due to the Earth's rotation under the assumption that the Earth is isolated in empty space.

c) The Earth is actually immersed in the the solar wind. The density of the solar wind n_e is roughly 10 proton/cm^3. Explain whether the radiation computed in part b) is detectable outside the solar system.