

## **Homework problems #3 (Lectures 6-8)**

1. The currents in household wiring and power lines alternate at a frequency of 60.0 Hz. (a) What is the wavelength of the EM waves emitted by the wiring? (b) Compare this wavelength to the Earth's radius. (c) In what part of the EM spectrum are these waves?
2. In order to study the structure of a crystalline solid, you want to illuminate it with EM radiation whose wavelength is the same as the spacing of the atoms in the crystal (0.20 nm). (a) What is the frequency of the EM radiation? (b) In what part of the EM spectrum (radio, visible, etc.) does it lie?
3. If a blackbody is radiating at  $T = 1650$  K, at what wavelength is the maximum intensity?
4. If the maximum intensity of radiation for a blackbody is found at  $2.65 \mu\text{m}$ , what is the temperature of the radiating body?
5. A black wood stove has a surface area of  $1.20 \text{ m}^2$  and a surface temperature of  $175^\circ\text{C}$ . What is the net rate at which heat is radiated into the room? The room temperature is  $20^\circ\text{C}$ .