

PROBLEM SET #4
ASTR 1030

Think each problem through, and present your logic.

1. What is the frequency of a "dental" x-ray having a wavelength of 0.1\AA ? What is its energy?
2. The star Zeta Puppis has a temperature of 30,000K. At what wavelength is it brightest?
3. The Earth has a temperature of 300K. Jupiter is 5AU from the Sun. Estimate the temperature of Jupiter in the following way. First, use the inverse square law to estimate what factor lower the sunlight flux per square centimeter is on Jupiter. Then, use the Stefan-Boltzmann Law to scale the equilibrium temperature, ie that temperature where the planet re-radiates all the solar flux incident upon it.
4. A radio transmitter on a spacecraft emits a signal at a frequency of 10^8Hz . At Earth the signal is received and noted to be at 99,970,000Hz. How fast is the spacecraft moving? Is it receding or approaching?