Astronomy 45

Introduction to Astrophysics

Problem Set 5 - Due October 25, 2002

1. The temperature of a red giant star is 2000 K and its absolute magnitude is -5.24.
    If the temperature of the Sun is 5770 K and its absolute magnitude is 4.76, what is
    the radius of the star in units of the solar radius?

2. Encke's comet has a period of 3.30 years. At perihelion it is at distance of 0.338
    AU from the Sun. What is the eccentricity of its orbit?

3. Titan is a satellite moon of Saturn. The period of its orbit is 15.945 days and the
    radius is 1.221×10^6 km. The gravitational constant G is 6.67×10^{-8} cm^3 g^{-1} s^{-2} .
    What is the mass of Saturn?

4. a) In a family of elliptical orbits, all of which have the same energy, show that the
    circular orbit has the greatest angular momentum.
    b) In a family of elliptical orbits, all of which have the same angular momentum,
    show that the circular orbit is the most bound.