Astronomy 45

Introduction to Astrophysics

Problem Set 6 Due November 8, 2002

1. At what altitude above the Earth are the gravitational forces due to the Earth and the Sun equal?

2. In a visual binary, the stars are $1''$ and $2''$ from the center of mass. The distance is 10 pc and the orbital period is 10 years. The angle $i = 90°$. What are the masses of the stars?

3. Velocity curves of a double-line spectroscopic binary are sinusoidal with amplitudes of 20 and 60 km s^{-1} and a period of 1.5 years. What are the masses of the two stars, expressed in solar masses? The orbital inclination is $90°$.

4. The spectral emission lines of an eclipsing binary system shift back and forth with a period of two years. The hydrogen Balmer line at 6562.8 Å is shifted by 0.2Å for one star and by 0.1Å for the other. What are the masses of the two stars and what are their orbital radii?