Problem Set #5 Problem 3

October 14, 2003

3. Determining the Size of the Astronomical Unit

(a) The period of Venus is 0.615 years. Use Kepler's laws to compute the ratio of D_V, the distance from Venus to the Sun, to D_E, the distance from the Earth to the Sun.

(b) Venus is just about to eclipse the Earth. What is δv, the relative velocity of Venus and Earth, in units of D_E. Remember that both planets are moving so that you will need to take a difference. For this problem, approximate the Earth's orbit and Venus' orbit as circular orbits.

(c) Two observers on the opposite side of the Earth observe the transit of Venus. The first observer sees the transit at 1 PM EST. The second observer sees the transit 1600 seconds later. Compute the distance from the Earth to the Sun. For this problem assume that the Earth does not rotate. The radius of the Earth is 6400 km.