PH3110 - Problem Set - Orbits

1. Prob. 6.3

2. Prob. 6.7

3. Prob. 6.9

4. Prob. 6.12

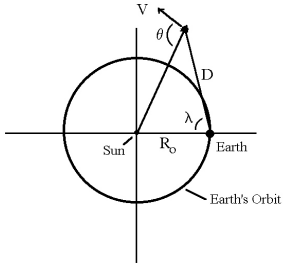
5. Prob. 6.18

6. Prob. 6.20

7. Prob. 6.26

8. A less-well-known astronomer, Len Sclouded, discovered three new asteroids moving in the plane of Earth's orbit and determined a limited amount of data about the asteroid's orbits, shown below. For each of the three asteroids, determine as many of the following as is possible for the data given.

a) The orbit's eccentricity, ϵ.
b) The distance of closest approach to the Sun.
c) The period of the asteroid's orbit.



Data

Dr. Sclouded measured the distance, D, and velocity, V, of the asteroids relative to the Earth. The data below have been corrected for the rotation of the Earth about its own axis and for the orbital motion of the Earth about the Sun. Distances are in units of R_0 = 1 A.U. = 1.5×10^{11} m, and times are in units of 1 year. Refer to the figure for the definition of λ and θ.

Asteroid	D	λ	V	θ
Alpha	1.0 R_0	90°	1.0 R_0/yr	90°
Beta	5.0 R_0	120°	6.3 R_0/yr	10°
Gamma	1.5 R_0	120°	4.5 R_0/yr	90°