Astr 1010
Problem Set #5
[Not to be turned in... will be worked in class!]

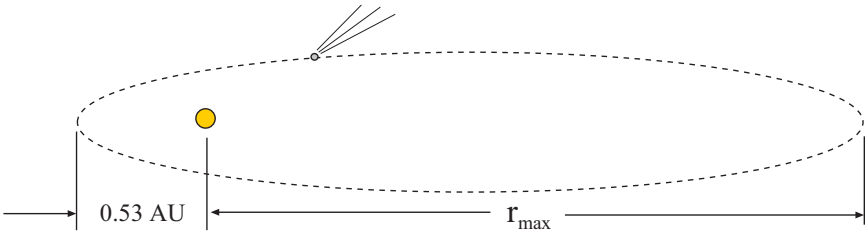
1. Use the data in the textbook, (last page of book, the stiff pull-out page) to verify that Kepler's law holds for the planets Mercury, Mars, Saturn and Neptune.

2. What is the period of a "planet" located 3.3 AU from the sun?

3. What is the semi-major axis of a planet whose period is 11.18 years?

4. Like the planets, Halley's comet orbits the sun in an elliptical path; so it too obeys Kepler's Third Law, $P_{\rm yr}^2 = a_{\rm AU}^3$. Unlike the planets, its orbit is *extremely* eccentric so that its distance of closest approach is very different from its farthest distance from the sun.

The orbital period of Halley's comet is 76.1 yr. Its minimum distance from the sun is 0.53 AU. What is its maximum distance from the sun?



5. If we drop a rock from a high place, how far does it fall in 5.0 sec? What is its speed at that time? How long does it take to fall 300 m? What will its speed be at that time?

6. On the moon, the value of g is only 1.6 $\frac{\rm m}{\rm s^2}$, about $\frac{1}{6}$ the value of earth's value of g. If we drop a rock on the moon, how far does it fall in 1 second? In 3 seconds? How long does it take to fall 300 m? What will its speed be at that time?

$$P_{\rm yr}^2 = a_{\rm AU}^3$$

Object falling from rest: $\quad d = \frac{1}{2}gt^2 \qquad v = gt \qquad g = 9.8\frac{\rm m}{\rm s^2}$