[1] Write an abstract of Prof. Osleger's Oct. 17 presentation.

[2] This second part of the assignment relates to your astronomy viewing night (even though it was cloudy...).

The table below gives the distances R of the planets from the sun (in miles) and their periods T, the time it takes them to go around the sun, (in seconds).

You will notice that the distances from the sun vary a lot: Pluto is 100 times farther from the sun than Mercury. The periods are also very different: Mercury completes 1000 orbits around the sun in the time it take Pluto to go around just once. There does not seem to be any particular pattern to the values of R or T.

Your assignment is to try to find a pattern hidden in these numbers. For each of the nine planets, compute the quantities $A = R/T$, $B = R^2/T$, $C = R/T^2$ and $D = R^3/T^2$. When you look at all the values of A, B, C, D do you notice that one of them is more constant than the others? By what factor do the values of A vary? How about B, C, and D?

The astronomer Tycho Brahe (1546-1601) systematically collected much of the data in Table 1. His student, Johannes Kepler (1571-1630) was the one who noticed the pattern that you will discover in your analysis. Godefroy Wendelin (1580-1667) discovered that that same pattern applies to the four bright moons orbiting Jupiter. Ultimately, Isaac Newton (1642-1727) showed that the pattern could be derived from his Law of Gravitation.

We will discuss this problem further in class. It is a beautiful example of how science works: Careful measurements (observations), followed by a clever person noticing a pattern, and finally the discovery of a Law from which the pattern can be derived.

Planet	Distance from Sun R (in miles)	Length of Year T (in seconds)
Mercury	36,000,000	7,440,000
Venus	67,200,000	19,400,000
Earth	93,000,000	31,600,000
Mars	141,600,000	59,400,000
Jupiter	483,600,000	374,000,000
Saturn	886,700,000	930,000,000
Uranus	1,784,000,000	2,650,000,000
Neptune	2,794,400,000	5,200,000,000
Pluto	3,674,500,000	7,820,000,000