Physics 109: Homework Questions (Handout #2)

Homework #3 Due 24 Sept Deadline 28 Sept

3.1 Compare and contrast the use of epicycles in the Ptolemaic and Copernican models of the solar system.

3.2 Is it possible for a planet to have a synodic period exactly equal to 1 Earth year? If so, would this be an inferior or superior planet or is it impossible to tell? Where would a planet with a synodic period a little bit longer than 1 Earth year be located?

3.3 Imagine that you are Tycho Brahe and are considering hiring Johannes Kepler to work on your vast store of astronomical data. Describe both a major strength and a major weakness in the qualifications of candidate Kepler for the position.

3.4 Demonstrate Kepler's Third Law of Planetary Motion using the tabulated values in Appendix 4 for the sidereal periods and semi-major axis lengths of the nine planets.

3.5 Explain how three of Galileo's telescopic discoveries supported the Copernican hypothesis.

Homework #4 Due 1 Oct Deadline 5 Oct

4.1 Consider the following (a) an object at rest on a table, (b) a ball rolling down an inclined surface under the action of gravity, (c) the bob of an oscillating pendulum, (d) a hockey puck sliding along a frictionless surface, and (e) a spacecraft in orbit about the Earth. Which of these are examples of inertial motion? Which are examples of accelerating motion and for these, list the unbalanced force that acts in each case.

4.2 Explain, in your own words, the difference between mass and weight. Likewise, explain the difference between acceleration and velocity.

4.3 Give an example from everyday life to illuminate each of Newton's Laws.

4.4 How would the gravitational force between two bodies change if the mass of each of them were doubled and the distance between them were halved? How would the gravitational force between two bodies change if the mass of *one* of them were doubled and the distance between them were also doubled?

4.5 The tidal acceleration on the Earth due to the Moon is just about twice as large as the tidal acceleration due to the Sun. How would the Moon or the properties of its orbit need to be changed in order for the tidal accelerations of the Moon and the Sun on the Earth to be equal. If this were so, would that eliminate tides on the Earth and why (or why not)?