

29:61 General Astronomy
Fall 2012
First Hour Exam . . . SAMPLE . . . September 19, 2012

Write legibly. Start each question on a new page. It allows me to make comments and generally keeps me in a better mood. Explain what ideas you are using and what you are trying to do. There are 8 questions. Notice that they differ in the number of points. Good luck and no whining.

Walk with Ursus!!!

(1) Define what is meant by the term *ecliptic*. This word has been used in two contexts in this course. Describe and define both terms, and explain the relationship between them. (5pts)

(2) Define *sidereal day*. Define *mean solar day*. Which is larger, and why? (5pts)

(3) The semimajor axis of the solar system object Sedna is approximately 500 astronomical units. What is its orbital period? (5pts)

(4) An object is moving in the following manner. Its mass is 5 kg. At a given time, the position vector describing its position relative to the origin is

$$\vec{r} = 2.50\hat{i} + 4.33\hat{j} + 0.0\hat{k}\text{meters} \quad (1)$$

Its velocity in the same coordinate system is

$$\vec{v} = 4.33\hat{i} + 2.50\hat{j} + 0.0\hat{k} \text{ m/sec} \quad (2)$$

What is the angular momentum? Be sure to express your answer as a vector, and express the number in SI units. (10pts)

(5) Make a sketch of an ellipse, and label the main parameters of this figure. Point out the foci. Define the eccentricity of an ellipse and illustrate the concept, using your diagram. (5pts)

(6) A car is initially driving due west at 60mph. It goes around a curve, and after a short period of time is heading due north. Its speed has been 60 mph all the time. Has it been subject to an acceleration? Give your reasons. (5pts)

(7) The declination of the star Antares in Scorpius is -26° . The city of Lüneburg in northern Germany has a latitude of $53^\circ 20'$ N. Is Antares ever visible from Lüneburg? Show your work that allows you to answer the question. (10pts)

(8) Today, the coordinates of the Sun are α (Right Ascension) 11h 20m, δ (Declination) $+4^\circ$. *Approximately* what will be the equatorial coordinates of the Sun 6 months from now, on March 12? (5pts)