Astronomy 301 – Fall 2019

Homework 1

Due Date: Wednesday, September 11, 9:00 AM

You must turn in your homework answers electronically via Canvas. A .pdf or .docx file would be best, but if you can get a good image of your hand-written homework, a .jpg or .png file would okay also. Make sure your name and eid appear at the beginning of your homework.

We encourage you to work together on the homework but you are not allowed to copy from each other. You must write out the answers in your own words.

1. Why are you taking this course? What are your goals for the course? Your answers can be non-astronomical (eg, "I need the course to graduate."), but they must not be foolish. (Three or four sentences is all that are needed for this question.)

2. a) What is the speed of light in cm/sec?
   b) What is the definition of the Astronomical Unit? How many centimeters are there in 1 AU? Calculate how long it takes light to travel from the sun to the Earth.

3. What is the ratio of the radius of the Earth to the sun? Of Jupiter to the sun? Draw three circles representing the sun, Jupiter, and the Earth side by side. Make the ratio of their radii the same as the ratio of the radii of the sun, Jupiter, and the Earth. Make the circles as accurate as you can.

4. Use the size of the Astronomical Unit in kilometers and the length of the year in seconds to calculate how fast the Earth moves in its orbit in kilometers/second. Why do you not feel this speed? (Hint: If you are not using π somewhere in your calculations, you are doing it wrong.)

5. a) What is the shape of orbits of planets? Suppose you cut an avocado in half lengthwise to see its cross section. How does the cross section of the avocado differ from the shape of an orbit?
   b) Suppose the orbital period of an asteroid is 8 years. What is its average distance from the sun?

6. Imagine that the mass of the Earth doubles and its radius also doubles. What would happen to your weight? (Hint: What should you use for the distance between you and the Earth?)