ASTR 101, Fall 2015.

Homework assignment #1.   Due on Friday 9/18.

Please answer in a separate sheet of paper. Write your name clearly at the top the sheet. Please staple multiple sheets together.

Write all steps in a calculation, not just the answer. Write legibly; if the grader can't read your answer, it will be considered wrong.

   You can discuss the problems with anybody or get help. But answers should be in your own words, with a full understanding of the answer. *Cheating or copying will result* in a *zero* for the assignment for all involved.

1)   Average distance between the Earth and the sun is 150 million km.
   I.   Assuming the orbit of the Earth is circular calculate the length of the Earth's orbit?
   II.   Calculate the number of seconds in a year (365 days).
   III.   Use above results to make a rough estimate of the orbital speed of Earth.

2)   Distance to Saturn these days is about 10.3 AU.

   a) What is the distance to Saturn in kilometers?

   b) How long does it take for light from Saturn to reach the Earth?

   c) Cassini is a spacecraft that has been orbiting and studying Saturn and its satellites since 2004. If a radio signal is sent to the Cassini spacecraft from the Earth command center, what would be the minimum time it takes to receive a response from Cassini? (Radio signals travels at the same speed as light= 3×10^5 km/s)

3)   Since light has a finite speed when we look at a distant object we are looking back in time. For example, when we look at a galaxy 10 million light years away what we see is, as it was 10 million years ago. Therefore would it be possible to see the past on the Earth if we could travel to a distant place in the universe and look at the Earth?

4)

   I.   Use the information in the class presentation slide 34 (on 8/28) to make a rough estimate of the number of galaxies in the universe.
   II.   Could the above estimate be a reliable estimate for the number of galaxies in the universe **today**? Explain your answer.