ASTR 101, Fall 2018

Homework assignment #1. Due on Wednesday 9/12.

Please staple multiple sheets together and write your name clearly at the top.

Please give clear, concise answers. While you are required to give clear detailed answers do not write facts irrelevant to what is asked in the question. Answers involving calculations should have all steps in calculations, not just the answer. Please 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 that the Earth's orbit 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 Jupiter these days is about 5.8 AU (astronomical units).
 - a) What is the distance to Jupiter in kilometers?
 - b) How long does it take for light from Jupiter to reach the Earth?

c) Juno spacecraft has been orbiting and studying Jupiter and its satellites since June 2016. If a radio signal is sent to the Juno spacecraft from the Earth command center, what would be the minimum time it takes to receive a response from Juno? (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 37 (on 8/24) 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?What are its flaws? (give at least two)

5) The diagram below shows the North star and the Big Dipper as they were in the sky on May 1st at 9PM from Oxford, Mississippi (latitude 34°).



i) What is the approximate angular height (altitude) of the North Star above the horizon?

ii) On the same diagram draw those stars as they would have appeared six hours later at 3AM as accurate as you can.

iii) If you view the same stars at the same time but from a location near the equator how the positions of those stars in the sky would be different? (you may draw a sketch to help explain your answer).