ASTR120 Homework #5 – (Hamilton)
due Thursday Oct. 17 (20 Points)

These problems are from Chapter 8. Finish reading the chapter!

12. What is meant by a substance's condensation temperature? What role did condensation temperatures play in the formation of the planets?

16. What is a chondrule? How do we know they were not formed by the ambient heat of the solar nebula?

23. Summarize the differences between the planets of our solar system and those found orbiting other stars.

29. (a) If the Earth had retained hydrogen and helium in the same proportion to the heavier elements that exist elsewhere in the universe, what would its mass be? Give your answer as a multiple of the Earth's actual mass. Explain your reasoning. (b) How does your answer to (a) compare with the mass of Jupiter, which is 318 Earth masses? (c) Based on your answer to (b), would you expect Jupiter's rocky core to be larger, smaller, or the same size as the Earth? Explain your reasoning.

*30. If you start with 0.80 kg of radioactive potassium (40K), how much will remain after 1.3 billion years? After 2.6 billion years? After 3.9 billion years? How long would you have to wait until there was no 40K remaining?

*31. Three-quarters of the radioactive potassium (40K) originally contained in a certain volcanic rock has decayed into argon (40Ar). How long ago did this rock form?

32. Suppose you were to use the Hubble Space Telescope to monitor one of the protoplanetary disks shown in Figure 8-8b. Over the course of 10 years, would you expect to see planets forming within the disk? Why or why not?

*38. Because of the presence of Jupiter, the Sun moves in a small orbit of radius 742,000 km with a period of 11.86 years. (a) Calculate the Sun's orbital speed in meters per second. (b) An astronomer on a hypothetical planet orbiting the star Vega, 25 light-years from the Sun, wants to use the astrometric method to search for planets orbiting the Sun. What would be the angular diameter of the Sun's orbit as seen by this alien astronomer? Would the Sun's motion be discernible if the alien astronomer could measure positions to an accuracy of 0.001 arcsec? (c) Repeat part (b), but now let the astronomer be located on a hypothetical planet in the Pleiades star cluster, 360 light-years from the Sun. Would the Sun's motion be discernible to this astronomer?