ASTR120 Homework #7 – (Hamilton)
due Thursday Oct. 31 (20 Points)

Finish reading Chapters 10 and 11. **These problems are from Chapter 10.**

29. Temperature variations between day and night are much more severe on the Moon than on Earth. Explain why.

31. Using the diameter and mass of the Moon given in Table 10-1, verify that the Moon's average density is about 3344 kg/m^3. Explain why this average density implies that the Moon's interior contains much less iron than the interior of the Earth.

33. The youngest lunar anorthosites are 4.0 billion years old, and the youngest mare basalts are 3.1 billion years old. Would you expect to find any impact breccias on the Moon that formed less than 3.1 billion years ago? Explain your answer.

37. Before the Apollo missions to the Moon, there were two diametrically opposite schools of thought about the history of lunar geology. The "cold moon" theory held that all lunar surface features were the result of impacts. The most violent impacts melted the surface rock, which then solidified to form the maria. The opposite "hot moon" theory held that all lunar features, including maria, mountains, and craters, were the result of volcanic activity. Explain how lunar rock samples show that neither of these theories is entirely correct.

These next problems are from Chapter 11.

41. Figure 11-1 shows Mercury with a greatest eastern elongation of 18° and a greatest western elongation of 28°. On November 25, 2006, Mercury was at a greatest western elongation of 20°. Was Mercury at perihelion, aphelion, or some other point on its orbit? Explain.

46. Find the largest angular size that Mercury can have as seen from the Earth. In order for Mercury to have this apparent size, at what point in its orbit must it be?

47. (a) Suppose you have a telescope with an angular resolution of 1 arcsec. What is the size (in kilometers) of the smallest feature you could have seen on the Martian surface during the opposition of 2005, when Mars was 0.464 AU from Earth? (b) Suppose you had access to the Hubble Space Telescope, which has an angular resolution of 0.1 arcsec. What is the size (in kilometers) of the smallest feature you could have seen on Mars with the HST during the 2005 opposition?

50. Imagine that you are part of the scientific team monitoring a spacecraft that has landed on Mars. At 5:00 p.m. in your control room on Earth, the spacecraft reports that the Sun is highest in the sky as seen from its location on Mars. When the Sun is next at its highest point as seen from the spacecraft, what time will it be in the control room on Earth?