ASTR121 Homework #6 – (Hamilton)
due Thursday Mar. 27 (15 Points)

Finishing reading Chapter 19. These problems are from that chapter.

Web Problem. Go to http://janus.astro.umd.edu/astro/stars/SunsLife.html to see an animation of the Sun's life. Match up the evolution to Figure 19.8, then peek ahead to Figure 20.5 and compare. The code shows you size and color changes while the plot shows luminosity variations. Test yourself by explaining why the various events happen. All you need to turn in is one or two sentences on anything that the code helped you understand or any confusion about the Sun's evolution that you still have.

38. As a red giant, the Sun's luminosity will be about 2000 times greater than it is now, so the amount of solar energy falling on the Earth will increase to 2000 times its present-day value. Hence, to maintain thermal equilibrium, each square meter of the Earth's surface will have to radiate 2000 times as much energy into space as it does now. Use the Stefan-Boltzmann law to determine what the Earth's surface temperature will be under these conditions. (Hint: The present-day Earth has an average surface temperature of 14°C.)

40. What observations would you make of a star to determine whether its primary source of energy is hydrogen fusion or helium fusion?

42. Would you expect the color of a Cepheid variable star (see Figure 19-18) to change during the star's oscillation period? If not, why not? If so, describe why the color should change, and describe the color changes you would expect to see during an oscillation period.

43. The brightness of a certain Cepheid variable star increases and decreases with a period of 10 days. (a) What must this star's luminosity be if its spectrum has strong absorption lines of hydrogen and helium, but no strong absorption lines of heavy elements? (b) Repeat part (a) for the case in which the star's spectrum also has strong absorption lines of heavy elements.

46. Suppose you find a binary star system in which the more massive star is a red giant and the less massive star is a main-sequence star. Would you expect that mass transfer between the stars has played an important role in the evolution of these stars? Explain your reasoning.

48. Suppose the detached star in β Lyrae (Figure 19-21b) did not have an accretion disk. Would the deeper dips in the light curve be deeper, shallower, or about the same? What about the shallower dip? Explain your answers.