

Astro 112 – Physics of Stars  
Homework #5, Fall 2011  
Due in class on Wednesday, November 30, 2011

- 1) Crack open your book to Section 7.4 and show that Equations a) 7.36, b) 7.37, and c) 7.38 are true.
  
- 2) Consider an inhomogeneous fully ionized star that obeys the ideal gas law. It is all hydrogen exterior to some mass shell  $m(r)$ , and all helium interior of  $m(r)$ . Find the ratio of interior density divided by exterior density at the density discontinuity  $m(r)$ .
  
- 3) Why does a star less than  $0.3 M_{\odot}$  star live longer than you would expect from a simple approximation that  $\tau_{\text{MS}}$  is proportional to  $M^{-2}$  (eq. 7.40) ?
  
- 4) The age of the Universe is 13.7 Gyr. Compare this value so the main sequence lifetime of a  $0.8 M_{\odot}$  star. Why isn't it useful to compute detailed models of the post main sequence evolution of stars much less massive than the Sun?
  
- 5) For a  $5 M_{\odot}$  star, briefly describe how the star's main sequence lifetime would change in duration if mass loss at the surface were enhanced during its time on the main sequence.