Year 1 Introduction to Astrophysics

Practice problems 2

- 1. Explain why stars cannot cool. What assumptions underly this conclusion, and why are they violated in the final evolutionary stages of low mass stars?
- 2. Estimate the Main Sequence lifetime of a 15 solar mass star. Explain the relationship between this result and the fact that HII regions are concentrated in regions of active star formation.
- 3. Given that a solar mass white dwarf has a radius similar to the Earth estimate how far below the Sun it would fall in the H-R diagram, assuming that it has a similar surface temperature.
- 4. What is the minimum spin period which could be sustained by a white dwarf before it is disrupted by centrifugal forces? What are the implications of this result for the nature of radio pulsars?
- 5. Give two arguments for the existence of dark matter.
- 6. If the Universe expanded at a constant rate, what would its age be, given our current best estimates of the Hubble constant? What sort of simple Universe would behave in this way, and what would be the value of the density parameter Ω for such a universe?

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