Observational Astronomy - Spring 2014
Homework 7 - Stars I

1. The Hipparcos satellite has a stated measurement accuracy of 0.002 arc seconds. How far away in parsecs is a star with a parallax of 0.002 arc seconds? How far is this in light-years?

2. We calculated that the intensity of radiation from the Sun at the Earth's orbit is about 1400 $\frac{\text{Watts}}{\text{m}^2}$. What is the intensity of solar radiation at the planet Neptune, at a distance of 30 AU from the Sun? Are solar cells a good way to power a spacecraft traveling to Neptune?

3. What process powers the stars? What element does the Sun consume for fuel and what element is produced in this reaction?

4. A star with 10 times the mass of the Sun has 10 times as much nuclear fuel as the Sun. Yet it lives for a much shorter time, only about 50 million years as compared to 10 billion years for the Sun. Explain why.

5. We know in detail which elements the Sun contains and about how much of each one. How do we know this?

6. On a Color-Magnitude diagram (or H-R diagram), most stars are found to fall along a curved diagonal line from the upper left (bright and blue) to the lower right (dim and red). What do we call this line? What is the primary parameter that determines where a star falls on this line?