Name: _____

Problem Set 7
Due Friday, November 2 at 10am (note: no class this day)
Submit via the Moodle link on the course website or by arrangement directly to Mark.

Part A – Conceptual Questions
1. What is meant by "radiative transport"? How is it related to opacity? What other stellar properties affect it and in what way?
2. What is an equation of state and why do we need it to solve the equations of stellar structure?
3. What assumptions go into deriving the equation of state for normal stars? Under what sorts of conditions will these assumptions no longer be reasonable?
4. Use the simulator at http://astro.unl.edu/naap/hr/hr.html to explore the H-R diagram. Note in ~1 paragraph each at least 5 things that you learn or wonder about based on your exploration. Wherever possible, speculate about the causes of phenomena that you observe based on things that you have learned about already in this class.

Part B – Quantitative Questions
1. The star Betelgeuse in the constellation Orion has a mass of $8M_\odot$ and a radius of $1200R_\odot$
   a. What is its density relative to the sun?
   b. What is the mean pressure inside Betelgeuse relative to that of the sun?
   c. What is the virial temperature for Betelgeuse? How does that compare to the sun?
2. The star Sirius B in the constellation Canis Major has a mass of $1M_\odot$ and a radius of $0.01R_\odot$
   a. What is its density relative to the sun?
   b. What is the mean pressure inside Sirius B relative to that of the sun?
   c. What is the virial temperature for Sirius? How does that compare to the sun?
3. Maoz Ch 3 #6