HW 2

AY 123, Spring 2003

Due Tues April 15, beginning of class

1. Prove that the gravitational potential energy for a polytrope is $\Omega = -\frac{3GM^2}{(5-n)R}$

2. Derive the mass-radius relation for an $n = 1$ polytrope and apply to Jupiter and Saturn

3. Write a computer program to solve the equations of stellar structure for an $n = 3$ polytrope and plot the ρ/ρ_c vs r/R for a solar model. Compare with a real solar model. You need only hand in your results but do bear in mind that you will eventually be computing a solar model using all of the equations of stellar structure.