Assignment 6

1. Solve the Lane-Emden equation for an Equation of State of the form

$$P \propto \rho^2$$

and plot the density as a function of radius in suitable units.

2. Using the tabulated numerical values for polytropic index 1.5 obtain the radius of a white dwarf of mass 0.6 $M_\odot$. Is the use of polytropic index 1.5 justified in this case? Discuss.

3. Evaluate the Chandrasekhar Limiting Mass for a White Dwarf.

4. A certain form of matter has an equation of state

$$P = \frac{1}{3}\rho c^2 - B$$

for $\rho > 3B/c^2$, and zero otherwise. B is a constant. Ignoring General Relativistic effects, discuss the mass radius relation and upper mass limit expected for stars made up of this matter.