1. A star has a constant core density $\rho_0$ out to a radius $R_0$. Beyond $R_0$ out to the stellar radius $R$, the density varies with radius $r$ as $\rho_0 (R_0^2/r^2)$. Calculate the mass interior to $r$ and obtain the stellar mass in terms of $\rho_0$, $R_0$ and $R$. Write down the equation of hydrostatic equilibrium and calculate the pressure $P(r)$ as a function of the radius $r$. (The pressure is zero at $R$ and everywhere continuous.)

2. Assume the solar luminosity is produced by the conversion of hydrogen to helium. Given that $L_\odot = 3.83 \times 10^{33}$ ergs s$^{-1}$, how much mass of hydrogen is converted to helium each second?

3. Consider two non-relativistic white dwarfs with the same central density, one of which is made of carbon with $\mu_e = 2.00$ and the other of iron with $\mu_e = 2.15$. Which star has the smaller radius and which the smaller mass? Also calculate the ratio of the Chandrasekhar masses of the two stars.