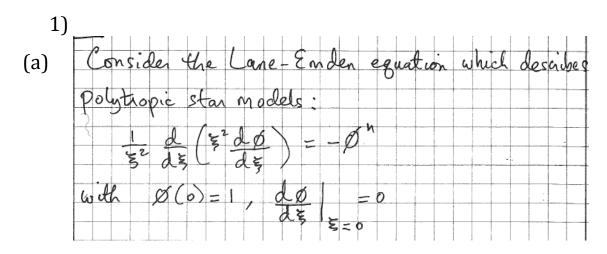
ASTRO 536 HW #5 - Due 11/22/17 in class

Each problem is worth 15 points, with (any) one problem counted as Xtra Credit



(b) Find analytic solutions for n=0 and n=1.

For each of these cases compute the mass,

mean density, radius, and central pressure
as a function of K and \(\chi\) (see (ectine

notes for definition of K & \(\lambda\).

Try to find an analytic solution for n=5.

Consider a Star described by the polytropic equation of state $P = K e^{(n+i)/n}$ and let R and M be the radius e maso of the Star, respectively. Prove that:

Gravitational $P \cdot E = IZ = -3 \cdot Gr M^2$ $S - n \cdot R$

Internal Energy = $U = 1 - G_1 M^2$ (x-D(5-n))RTotal Energy = $E = -3(x-4/3)G_1 M^2$ (x-D(5-n))RMean Temperature = $T = \int g T dV = \mu m_p G_1 M$ $\int g dV = k(5-n)R$ [Hint: Start with Ω]

Consider the standard set of stellar structure equations for a completely convective stan for which 8=5/3 throughout. Prove that P& g are given by the polytropic relation for n=1.5

P=KPn where K is given by bornula E=4TTK 61/2 M/2 R^{3/2} = 45.5

Griven M and R, calculate the central Temp, T.

It can be shown that the Hayashi protostars for M & Mo correspond to the model during their descent along the Hayashi back after gives i-static equil.

Calculate the central temperature, Tc, and radius of a star of M=Mo assuming that it can be described as a polytrope of N=1.5 and its total internal energy is equal to the energy spent in dissociation of H2 and conjuction of H and He. Take X=0.70 and Y=0.28.