HOMEWORK #5

1. Problem 12.2 of the text.

2. Problem 12.15 of the text.

3. Problem 10.1 of the text.

4. Problem 10.20 of the text. (Only do parts a and b.)

5. Problem 10.23 of the text.

6. The interior structure of some objects can be approximately described by polytropes. Jupiter can be roughly modeled by a polytrope of $n = 1$. Given the mass M and radius R of Jupiter, derive an expression for the central density ρ_c. Recall that for $n = 1$, one has that $D_1 = \sin \xi / \xi$, $r = \lambda_1 \xi$, and $\xi_1 = \pi$.

   Hint: Use the relation:

   $$M = 4\pi \, \rho_c \int_0^R D_1(\xi) \, r^2 \, dr.$$

   Then insert values for M and R to find ρ_c. You will need to relate λ_1 to R.