

Geophysics Problem: Due 2/6/2006

1. **Exploiting Constraints:** Suppose a planet with radius 6,371 km has a core 2,900 km below the surface. The planet has a mass of  $6 \cdot 10^{24}$  kg and a moment of inertia (I) of  $0.3306 MR^2$ . Assuming that the mantle and core have constant but different densities ( $P_c$  &  $P_m$ ), calculate  $P_c$  and  $P_m$ .

This is an algebra problem, with two equations in two unknowns:

- mass of planet = mass of mantle + mass of core
- moment of planet = moment of core + moment of mantle.

Solve for the two unknowns,  $P_c$  and  $P_m$ ; neat and careful use of symbols will help you keep track of things. How do your results compare to accepted values for Earth? Note – they should be close!

Bonus recreation.

There are at least three ways to solve this problem:

1. using matrix algebra
2. using simple algebra
3. using Excel's Solver.

The recreation – solve it each way and compare your results.