ESCI7205: HW 7
Due: Tue Nov. 10, 2009

1) This is a short exercise for Matlab. Calculate and plot the acceleration of gravity, g(r), from r=0 to r=4R_e, for a planet that consists of a core and mantle (use radii of R_c =3480 km for the core and R_p =6371 km for the planet, and densities of 11.5 g/cm^3 for the core and 5 g/cm^3 for the mantle). Compare the qualitative results from this planet to g(r) for earth.

Useful information: G=6.6726 10^{-11} Nm^{2}kg^{-2}.

Acceleration of gravity as a function of radius inside a sphere of uniform density ρ :

$$g(r) = \frac{GM(r)}{r^2} = \frac{G\left(\frac{4}{3}\pi r^3 \rho\right)}{r^2} = \frac{4}{3}\pi G \rho r .$$

Acceleration of gravity as a function of distance outside a sphere of uniform density: $g(r) = MGr^{-2}$.

$M(r)$ and M are the masses as a function or radius when inside and the total mass when outside.

The volume of a sphere is $V = \frac{4}{3}\pi r^3$.

Ave dens whole earth 5.5 g/cm^3.