

PHY 3221 : Intermediate Mechanics, Spring 2003

February 21st, 2003

Assignment # 7

(due Friday February 28th, 2003, at the beginning of class)

1. Show that the gravitational potential of a uniform ($\rho = \text{constant}$) solid sphere of radius a and mass M is given by:

$$\phi(r) = \begin{cases} -\frac{GM}{r} & r > a \\ -\frac{GM}{2a^3}(3a^2 - r^2) & r < a \end{cases}$$

where G is Newton's constant, the universal constant of gravitation. Derive the gravitational field $\vec{g}$ in both cases.

2. Problem 5.7 of Marion and Thornton's book.
3. Problem 5.13 of Marion and Thornton's book.
4. Problem 5.15 of Marion and Thornton's book.