PHYS 328
HOMEWORK #10

Due : Tuesday 13 Nov. 2012

1. Consider an electron in a hydrogen atom. Recalling that an electron in the n^{th} energy level can have n - 1 values of l, the total angular momentum. Remember also that the electron can have 2 l + 1 values of L_z (the projection of angular momentum on the z axis). Show then that the total number of states available to this electron is n^2.

2. Starting from the result :

$$\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \arctan\left(\frac{x}{a}\right)$$

where a is a constant (such that a > 0).Use techniques shown in Appendix B to calculate :

$$\int_0^\infty \frac{dx}{\left(x^2 + a^2\right)^3}$$

3. Problem 6.19
4. Problem 6.31
5. Problem 6.33
6. Problem 6.39 all parts. Part a) worth 10 pts, parts b) and c) worth 5 points.