HW Set 2

Chem 215B

Due January 22

Problem 1: A rotator whose orientation is specified by the angular coordinates θ and ϕ performs a ***hindered rotation*** described the Hamiltonian

$H = A\mathbf{L^2} + B\hbar^2 cos(2\phi)$ with $A >> B$.

Calculate the S, P, and D energy levels of this system in first order perturbation theory, and work out the corresponding unperturbed energy eigenfunctions.
Hint: Recast the perturbation in terms of $Y_m^l(\theta, \phi)$*'s.*

Sakurai Problems: 12, 15, 16, 17