Homework 4. Due Monday Oct 25 at 5pm in Prof. Ginger’s mailbox.  
CIRCLE YOUR ANSWERS AND KEY INTERMEDIATE RESULTS  
STAPLE YOUR PAPERS TOGETHER  
INCLUDE ALL COMPUTER PRINTOUTS

This week’s set is much shorter due to the Exam on Oct 22.

**McQuarrie Exercises**

5.18 – RMS displacement compared to equilibrium bond length for H.O.
6.3 – calculating probabilities with 3D wavefunctions
6.6 – plot the energy eigenfunctions for the 2D particle in a box using the functions given in 6.4, *use maple to make your plots*
6.13 – rotational spectra of HBr

**Additional Problems:**

1) Find the volume of a sphere of radius $a$ by integrating the volume element $dV = r^2 \sin(\theta)drd\theta d\phi$ in spherical polar coordinates from $r=0$ to $r=a$ (and over all values of theta and phi)

2) Find the commutators $[L^2, L_z]$ and $[L_z, L_x]$ What does this tell you about attempts to measure these quantities simultaneously? Write down an uncertainty principle for $\Delta L_z \Delta L_x$