

Chem 2430 HW #3, Due 9/30.

1. Using ladder operators evaluate $\langle 0 | x^3 | 1 \rangle$ for the harmonic oscillator problem

2. For the harmonic oscillator problem what is $\Delta x \Delta p_x$?

3. Given the potential energy curve

$$E = 4\epsilon \left[\left(\frac{r}{R} \right)^{12} - \left(\frac{r}{R} \right)^6 \right]$$

what is the vibrational energy in the harmonic approximation?