Quiz 7.5 – Vibrational Motion

Harmonic Oscillator			

Name:

Consider a quantum mechanical harmonic oscillator with mass equal to 8.5~AMU and a force constant of $400\frac{N}{m}$. What will be the zero-point energy in (J) for this system?

Consider the same quantum mechanical harmonic oscillator introduced above in the first excited state (v=1). The normalization constant for this state is: $N_1=1.94\times 10^6$. You are interested in finding the probability that the oscillator will be found with a displacement between x=-0.1~pm and x=0.1~pm.

Give the integral which you would evaluate to find that probability (including the appropriate limits of integration). Also, sketch the probability distribution function with the integrated area shaded.