Homework #1 for Physics 371
Due Friday, January 22 (by 4pm in the blue box outside PAS 220)

1) Problem 1.3, Griffiths.
2) Minimum energy of a harmonic oscillator

The energy of a simple harmonic oscillator is

\[ E = \frac{p_x^2}{2m} + \frac{m\omega^2 x^2}{2}, \]

where \( \omega \) is the natural frequency. Use the uncertainty principle

\[ \Delta x \Delta p_x \geq \frac{\hbar}{2} \]

to estimate the minimum (average) energy \( \langle E \rangle \) of the oscillator. Assume that the minimum energy state is such that \( \langle p_x \rangle = 0 = \langle x \rangle \), so that \( \Delta p_x^2 = \langle p_x^2 \rangle \) and \( \Delta x^2 = \langle x^2 \rangle \).