Physics 371 Midterm 2 Practice Problem

Calculator and crib-sheet allowed (8.5"x11", one side)

4) Uncertainty relations

Consider a particle of mass m moving in a one-dimensional potential well.

a) Derive an uncertainty relation for the position and the momentum squared, i.e., an inequality for the uncertainty product

$$\Delta x \Delta(p_x^2) \geq ?$$

b) Apply this inequality to an energy eigenstate of a particle in a box. Is it possible to know p_x^2 exactly and still know the position with some finite precision?