

THE UNIVERSITY OF CHICAGO
PHYSICS DEPARTMENT

PHYSICS 551
 ADVANCED QUANTUM MECHANICS
 SPRING 2012
 PROBLEM SET 1
 DUE DATE: FEBRUARY 13, 2012

1. (20 points) A particle of mass m is confined to a one-dimensional potential well of width a . The potential is zero inside the well and infinite outside. The wave function is given by $\psi(x) = \sqrt{\frac{2}{a}} \sin\left(\frac{n\pi x}{a}\right)$ for $0 < x < a$ and zero elsewhere. Calculate the expectation value of the momentum $\langle p \rangle$ and the uncertainty in momentum Δp for the state $n=1$.

QUESTION

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