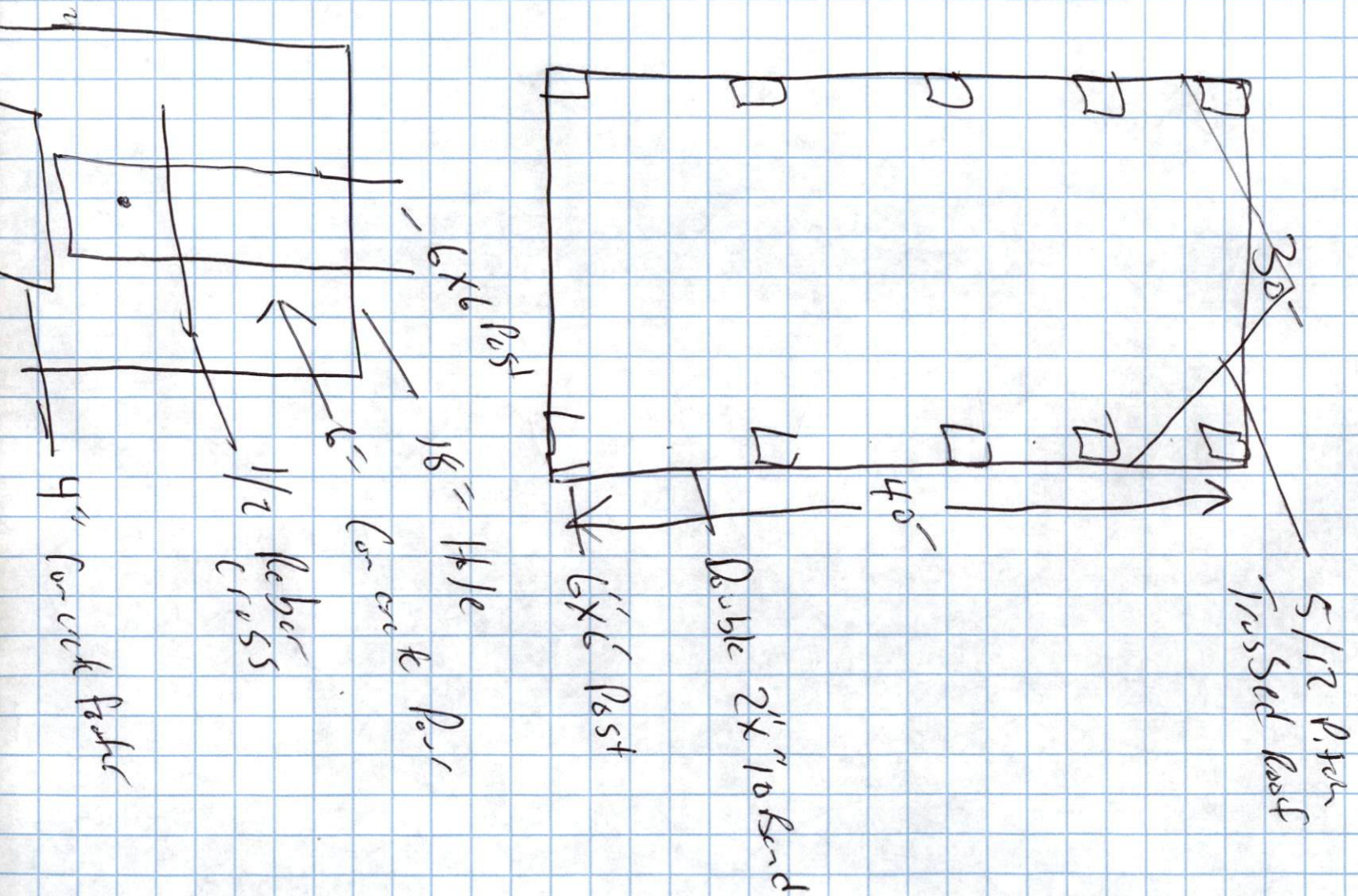


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THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYS 441 - QUANTUM MECHANICS

PROBLEM SET 10

Due: Friday, November 12, 2010

1. A particle of mass m is confined to a one-dimensional potential well

defined by $V(x) = 0$ for $0 < x < a$ and $V(x) = \infty$ elsewhere.

(a) Find the energy eigenvalues E_n and the corresponding normalized energy eigenfunctions $\psi_n(x)$.

(b) Suppose the particle is initially in the ground state $\psi_1(x)$ at $t = 0$. Calculate the probability of finding the particle in the first excited state $\psi_2(x)$ at a later time t .

(c) Calculate the expectation value of the position $\langle x \rangle$ and the momentum $\langle p \rangle$ for the ground state.