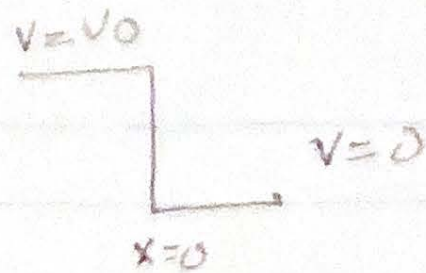


Chem 2430 HW #2

1. Consider the potential.
- $V=0, x \geq 0$
 $V=V_0, x < 0$

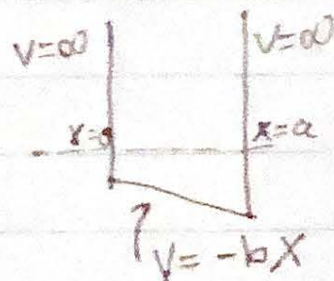


Work out as far as you can the wave functions when $E < V_0$ and when $E > V_0$.

Do you expect partial reflection when $E > V_0$. If so, explain why.

2. Does the momentum operator \hat{p}_x commute with the Hamiltonian operator for the particle-in-box problem with infinite potential outside the box. Explain your answer.

3. Consider the following potential. Unlike the usual particle-in-box problem, it has a sloped bottom.



Calculate the energy of this system using the wave function $\sqrt{\frac{2}{a}} \sin\left(\frac{\pi x}{a}\right)$.

4. Consider a particle in a rectangular box with potential 0 inside and ∞ outside with the inside given by $0 \leq x \leq l, 0 \leq y \leq \frac{l}{2}$.

Can this system have degeneracies? If so are they symmetry related or accidental?