Physics 3610H: Assignment II

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September 16, 2025

Problem 1. Consider a single particle of mass m moving in one dimension subject to the following potential:

$$V(x) = \begin{cases} \infty, & x < -c \\ 0, & -c < x < c \\ \infty, & x > c \end{cases}$$

(a) Find the eigenvalues and eigenstates of $\hat{H}$ for this system, that is the energies E and the states ψ for which $\hat{H}\psi = E\psi$.

(b) Examine the two lowest energy states:

    (i) Draw two plots showing ψ vs x for the two lowest energy states.

    (ii) This is very similar to the problem we solved in class. Comment on whether your results for the two lowest energy states (both the energies and the states) are consistent with those we found in class.

    (iii) Show that the two lowest energy states are orthogonal.

Solution 1.

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