PHYS 2601: Classical and Quantum Waves PSet 10

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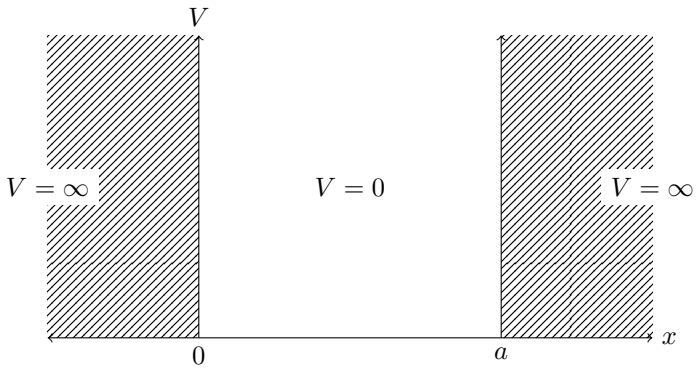
Problem 1 (25 points)



A quantum particle is placed inside a 1 dimensional box, such that the potential V is as follows:

$$V(x) = \begin{cases} 0 & 0 \leq x \leq a \\ \infty & \text{otherwise} \end{cases}$$

a) Solve the time-independent Schrödinger equation to find the allowed energies of a particle inside the box for any nonzero integer n, where n denotes the energy level. (hint: use boundary conditions) (10 points)
b) What are the corresponding allowed $\Psi_n(x)$ inside the box? (5 points)
c) Find the normalization factor for $\Psi(x)$ (hint: the probability of finding the particle somewhere inside the box must be 1) (5 points)
d) What's the probability of finding the particle in the ground state n=1 between $x = a/2$ and $x = 3a/4$? (5 points)

Problem 2 (5 points)

Write a brief essay on the interpretations of quantum mechanics.