Quiz #8 (Time-dependent Schrödinger's Equation)

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Quantum Mechanics

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Prob. 1(3)

Determine whether each of following expressions can be a solution of time-dependent Schrödinger equation or not. Give a brief explanation.

(a) $\sin\left[i(kz - \dfrac{E}{\hbar}t) \right]$

(b) $\exp\left[-i(kx + \dfrac{E}{\hbar}t) \right] + 1$ when V(x) is non-zero.

(c) $\sin(\dfrac{2\pi x}{L}) \exp(-i\dfrac{\hbar^2 \pi^2}{2mL^2}t)$ for $0 \le x \le L$

Prob. 2(2)

It is known that the solution of the Schrödinger equation at t=0 for an infinite barrier potential well having V(x) = 0 for $0 \le x \le L$ is 1, or $\psi(x, t=0) = 1$ for $0 \le x \le L$. Determine the expression for $\psi(x,t)$.