Quiz #5 (Particle in a Box)

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Quantum Mechanics
Prof. Woo-Young Choi
Dept. of Electrical and Electronic Engineering
Yonsei University

Prob. 1

Consider an electron with mass m in an one-dimensional quantum well having infinitely large potential barriers located at x = - L and x = L. Assume the potential energy is zero inside the well. Determine the expressions for eigen wave functions and corresponding energy eigen values

Prob. 2

What is the wavelength of an electron with mass m in the ground state of the infinite barrier quantum well given in Prob. 1.

Prob. 3

Determine true of false for the following statements. Give a brief explanation.

(a) For a particle in the infinite barrier quantum well, its average velocity is zero.

(b) The problem of determining the wave function for a particle in the infinite barrier is mathematically identical to the problem of determining the magnitude of the electromagnetic wave confined between two mirrors with 100% reflectivity.