CL18_Q1. Derive the expression of energy Eigen values for a particle in an infinite potential well using the admissible solutions.

CL18_Q2. The wave function associated with a particle in a infinite potential box is $\psi = \left(\frac{2}{L}\right)^{1/2} sin\left(\frac{\pi x}{L}\right)$ for $0 \leq x \leq L$. What is the probability of finding the particle in the region $(i)\ 0 \leq x \leq L/2$ and $(ii)\ 0 \leq x \leq 3L/4$?

CL18_Q3. Plot the probability densities for the first three excited quantum states of an electron trapped in an infinite potential well of width L.

CL18_Q4. A particle is free to move in a one dimensional region of zero potential between the two rigid walls at $x = -a$ and $x = a$. If E_n is the energy of the nth state and ΔE_n is the energy separation between the $(n+1)^{th}$ and n^{th} state, then show that $\frac{\Delta E_n}{E_n} = \frac{(2n+1)}{n^2}$

CL18_Q5. The lowest energy level of a particle confined to a one-dimensional region of space with fixed dimension L is E_o (i.e., a "particle in a box"). If an identical particle is confined to a similar region with fixed distance $\frac{1}{9}L$, what is the energy of the lowest energy level that the particles have in common? Express your answer in terms of E_o