Numerical Problems Infinite Potential Well and Energy Eigen Values

1.) An electron is trapped in an infinite potential well of width 0.01m; find the principal quantum number for which energy is 1 eV. $m_e = 9.1 \times 10^{-31}$ kg

2.) A proton is confined in an infinite square well of width 10 fm. Calculate the energy and wavelength of the photon emitted, when the proton undergoes a transition from the first excited state to the ground state.

3.) A particle is in the nth energy state of an infinite square well potential with width L
   a.) Determine the probability that the particle is confined to the first (1/a) of the width of the well

4.) The wave function for a certain particle is $\psi = A \cos^3 x$ for -, Find the value of A.

5.) The normalized wave function of a particle is $\psi = A$. Calculate the energy Eigen value of the particle.

6.) An electron is moving freely with energy 2 eV. Calculate its de-Broglie Wavelength

7.) An electron is trapped completely in a 1-D well of length 1 Angstrom. How much energy must be supplied to excite the electron from the first excited state to the 3rd excited state?

8.) A quantum particle confined to a 1-dimensional box of width 'a' is in its first excited state. What is the probability of finding the particle over an interval of (a/2) marked symmetrically at the center of the box?

9.) An electron is trapped in a 1-D potential well of infinite depth and width 1×10^{-10} m. What is the probability of finding the electron in the region from $x_1 = 0.09 \times 10^{-10}$m to $x_2 = 0.11 \times 10^{-10}$ m in the ground state?

10.) Find the probability that a particle trapped in an infinite well of width L can be found between o.45L and 0.55L for the ground and first excited states?