Assignment 8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

1) If \( E_0(\phi) \) is the calculated value of energy for a system, while \( E_0 \) is the actual value of its energy, then, according to upper limit theorem,
   ○ \( E_0(\phi) \leq E_0 \)
   ○ \( E_0(\phi) = E_0 \)
   ○ \( E_0(\phi) = E_0 \)
   ○ \( E_0(\phi) \geq E_0 \)

No, the answer is Incorrect
Score: 0
Accepted Answers:
\( E_0(\phi) \geq E_0 \)

2) In variational treatment of a quantum mechanical problem.
   ○ the system should be close in energy to an exactly solvable system
   ○ the first step is to choose a trial function whose value can be changed by varying a parameter
   ○ large number of iterations lead to convergence towards the best possible value
   ○ greater number of parameters result in a poorer fit

No, the answer is Incorrect
Score: 0
Accepted Answers:
the first step is to choose a trial function whose value can be changed by varying a parameter
large number of iterations lead to convergence towards the best possible value

3) While proving variation theorem, the trial function is expressed as a linear combination of wavefunctions that are necessarily
   ○ normalized
   ○ orthogonal to each other
   ○ real
   ○ imaginary

No, the answer is Incorrect
Score: 0
Accepted Answers:
normalized
orthogonal to each other

4) Other than \( \cos \lambda x \), valid trial function[s] for the ground state of a harmonic oscillator could be
   ○ \( \tan \lambda x \)
   ○ \( \cos^{-1} \lambda x \)
   ○ \( \log \lambda x \)
   ○ \( e^{\lambda x} \)

No, the answer is Incorrect
Score: 0
Accepted Answers:
\( e^{\lambda x} \)

5) Using as the trial function, the expected value of energy for the ground state of harmonic oscillator turns out to be
   \[ E_{\text{min}} = \alpha \frac{\hbar}{2} \]
   The value of \( \alpha \) is ____________

Hint

No, the answer is Incorrect
Score: 0
Accepted Answers:
\( \alpha \frac{\hbar}{2} \)

6) For a particle in a box with infinitely large potential barriers at \( x = 0 \) and \( x = L \),
   let a trial function be \( \phi(x) = f(x), g(x) \). For this trial function to be valid, \( f(x) \) or \( g(x) \) can NOT be
   ○ \( x + 3 \)
   ○ \( 3x \)
   ○ \( x^3 \)
   ○ \( x - L \)

No, the answer is Incorrect
Score: 0
Accepted Answers:
\( x + 3 \)

7) For a particle in a box, using the trial function \( \phi = c_1f_1 + c_2f_2 \), where \( f_1 = x(1-x), f_2 = x^2(1-x)^2 \), energy of the lowest energy level comes out to be \( \alpha \frac{\hbar}{m} \). Here, \( \alpha = ____________

Hint

No, the answer is Incorrect
Score: 0
Accepted Answers:
\( \alpha \frac{\hbar}{m} \)