Homework #1

(due Wednesday, January 14, 2026)

1. (10 pts) McIntyre 2.17

2. (10 pts) McIntyre 5.11

3. (10 pts) The particle is moving in a potential described by $U(x) = -\lambda \delta(0)$ where λ is a positive constant.

   (a) What is the dimensionality of λ ?
   (b) Sketch the potential energy U(x)
   (c) Solve the energy eigenvalue equation analytically to find the <u>bound state</u> energy eigenvalue and corresponding eigenfunction.

   (d) Sketch the wavefunction and discuss its features.

4. (10 pts) Fill in the table that describes the different representations of the operators, eigenvalues, eigenstates *etc*. for a quantum particle subject to a 1-dimensional infinite square well potential energy (p. 2).

5. Review Ch. 1-5 of McIntyre.

1-d infinite well potential energy	Ket Representation	Matrix Representation	Wave Function Representation	Graph Representation (if any)
Hamiltonian				
Eigenvalues of Hamiltonian				
Normalized eigenstates of Hamiltonian				
Coefficient of nth energy eigenstate				
Probability of measuring E_n				
Expectation value of Hamiltonian				