

Quiz on Chapter 3 : Test your knowledge of concepts from chapter 3

1. What is the definition of a Hermitian operator?
2. Circle the correct one: The expectation value of a Hermitian operator is real/imaginary/complex.
3. Q_1 and Q_2 are Hermitian. Under what circumstances is the linear combination $\alpha Q_1 + \beta Q_2$ Hermitian?
4. What is the Hermitian adjoint of the product of two operators AB in terms of their Hermitian adjoints A^\dagger and B^\dagger ?
5. Prove in three lines that the eigenvalues of normalizable eigenfunctions of a Hermitian operator are real.
6. Prove in three lines that normalizable eigenfunctions of a Hermitian operator, corresponding to different eigenvalues, are orthogonal.
7. Write down the formula associated with “Dirac” orthonormality for the eigenfunctions of an operator with a continuous spectrum (call the eigenvalues q and the eigenfunctions f_q).
8. Write down a formula for the expectation value of an operator in terms of the eigenvalues of that operator and the expansion coefficients for a state in terms of the eigenfunctions.
9. Write down the generalized uncertainty principle for operators A and B .
10. Write down a formula for the time evolution of an expectation value $\langle Q \rangle$.