3/21/01

Lec 26 Review

Midterm 3/23 in class
Closed book
One page of your notes

Exam will have some short problems and some short answer questions

Review

Chapter 1

Wave func is prob. density

Mean value

Variance

Standard deviation

Generalized stat. interp.

$$\Psi(x,t) \equiv \langle e_x | \Psi \rangle$$

$$\Phi(p,t) \equiv \langle e_p | \Psi \rangle$$

$e_{x_0} = \delta(x - x_0)$ position eigenstates

$e_p = \frac{1}{\sqrt{2\pi\hbar}} e^{ipx/\hbar}$ Momentum eigenstates

$$\Phi(p,t) = \frac{1}{\sqrt{2\pi\hbar}} \int_{-\infty}^{\infty} e^{-ipx/\hbar} \Psi(x,t)\, dx$$

Momentum space wave func. is f.t. of coord. space wave func.

Note f.t. pairs

$$f(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(k)\, e^{ikx}\, dk$$

$$F(k) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(x)\, e^{-ikx}\, dx$$

Linear algebra and Matrix Mechanics

State vector is abstract vector in Hilbert space

$$\underline{\underline{H}}\, \underline{\Psi} = E \underline{\Psi}$$

$$\det \left[\underline{\underline{H}} - E\, \underline{\underline{I}} \right] = 0$$ to find eigenvalues and eigenvectors

Change of basis with Unitary transformation

Eigenfunctions are normalized
orthogonal
complete

Hermitian operator

$$A^{+} = A$$

$$A^{+} = \tilde{A}^{*}$$

$$\langle \Psi | A \phi \rangle = \langle A \Psi | \phi \rangle$$ for any ϕ, Ψ