Final Exam Wednesday

Saturday, December 10, 2016 19:51

a) wave-particle duality.
quantization, dispersion
wave function → probability density
Gaussian Wave Packet – Fourier Transform (frequency distribution)
Expectation value, uncertainty in momentum / position.
Minimum uncertainty wavepacket

b) 1-dimensional potentials of Ch. 2.
– see review for Exam 2.

c) postulates – apply to the 2-state system
1) Superposition postulate:
State of particle represented by a linear vector
with probability amplitude as components.
2) expansion / projection postulate:
hermitian operators represent observables
eigenfunctions of an operator represent definite states
eigenvalue is value of observable for corresponding state.
components in eigenbasis are probability amplitudes of observation
immediately after observation, the wave function collapses.
3) evolution postulate: TDSE
eigenfunctions of the Hamiltonian are stationary states
with simple time evolution: $e^{-iE_n t/\hbar}$ (separation of variables)

d) 2 and 3-dimensional potentials - separation of variables
infinite square well on a rectangle, cylinder, sphere - eigenstates/energies
hydrogen potential – solve series solution for energy & wavefn.
characterize the quantum numbers and node lines (planes) for each.