

Chemistry 113A HW#5, 11/8/ 2005

The Solutions should be turned in at the start of next weeks' Tuesday discussion section. No Late Homework will be accepted.

- 1) Two particles with reduced mass μ are bound by a square well potential of width L . The system was created in a state $\psi(x)=Nx(x-L)$, where N is the normalization constant. Expand this state in the square well basis and find the probability for the system to be in eigenstates with $n=1$ to 6 . What is the average energy of the system?
- 2) Do the operators: $H=(ih/2\pi) \delta/ \delta t$, the Hamiltonian and t , the time operator commute?
- 3) What information can you derive from the answer of problem #2 about the two operators : H and t , do you believe it, why or why not?
- 4) Given an arbitrary, normalized wave function $f(x)$, that is neither odd nor even under inversion, i.e., it has no parity: use it to construct odd and even functions and prove that these functions are orthogonal. You must also show that the new odd and even functions are eigenfunctions of the inversion operator.

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