University of California, Berkeley
EE236
Fall 2004

Problem Set 1
Due September 10, 1:00pm

1. Show that if an operator is Hermitian, then the matrix which represents it is Hermitian, and the reverse. Hermitian matrix: $a^*_{nm}=a_{nm}$, where * means complex conjugate
2. Show that the product of the matrices representing two operators represents the product of the two matrices.
3. Show that two operators commute if and only if the matrices which represent them commute.
4. Find a matrix representation for the operator X for the particle in a box (infinite potential)
5. Find the probability distributions for a measurement of the position x of a particle in a box at a time t, provided that it starts in a state which has equal amplitudes for being in the ground state and the next higher energy state, (pick the initial phase to be real, and yielding a positive value for each of the eigenstate's wavefunctions for $x>0$).
6. Discuss what state the particle is in immediately after making the measurement of problem 5, and what the subsequent time evolution would be.