

EE 236
Fall 2004
Homework set 2,
Due Friday, September 17

- 1) Show that the Hermitian conjugate of the product of two operators is the product of the Hermitian conjugate of each of the operators, in reverse order.
- 2) We discussed in class that if an operator is Hermitian, has discrete eigenvalues, and is non singular then its eigenstates form a complete orthogonal set. For this problem, show the opposite, that is that if an operator's eigenstates form a complete orthogonal set, then it is Hermitian. (Note that it does not matter if some of the eigenvalues are the same to show this)
- 3) If two or more eigenstates of a Hermitian operator have the same eigenvalue, they are not necessarily orthogonal. Show that if an operator has two eigenstates which are not linearly dependent, (linearly dependent: $|x\rangle = A|y\rangle$ for some value of A), but have the same eigenvalue, that a new pair of orthogonal eigenstates can be generated from them.
- 4) Yariv problem 2.1
- 5) Yariv problem 2.3
- 6) Yariv problem 2.6
- 7) Yariv problem 2.7