

Homework 3 (5 points each problem)

1. Express $(\hat{A}\hat{B})_{mn}$ through the matrix elements of \hat{A} and \hat{B}

2. Show that $\sum_n |\psi_n\rangle\langle\psi_n| = I$

3. Show that $(\hat{A}\hat{B})^{-1} = \hat{B}^{-1}\hat{A}^{-1}$

4. Show that $(\hat{A}\hat{B})^+ = \hat{B}^+\hat{A}^+$

5. Show that eigenvalues of hermitian operators are real

6. Show that two eigenstates with different eigenvalues are orthogonal

7. Show that if operators have common eigenstates they will commute

8. (10 points) Starting with time dependence state vector $|\psi(t)\rangle$ and time translation operator $U(t, t_0)$ derive Schroedinger equation.