Homework for Advanced Quantum Mechanics. No. 6

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Deadline 2016-11-16 before class.

1. The trace of a matrix is the sum of the eigenvalues of this matrix. If $\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, validate it.

2. $X = \int dx|x\rangle\langle x|x$, $Y = \int dy|y\rangle\langle y|y$, $Z = \int dz|z\rangle\langle z|z$. Prove[X,Y]=[Y,Z]=[X,Z]=0.

3. Prove: (1) Translation operator T_a is unitary.

(2) $[\mathrm{T}_a,\mathrm{T}_b]=0$; $\mathrm{T}_a+\mathrm{T}_b=\mathrm{T}_{a+b}$.