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5.73

Quiz 10

September 27, 2002

1. Multiply the following pairs of matrices:

A. $(0 \ 1 \ 0 \ 0) \otimes \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} =$

B. $\begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} \otimes (0 \ 1 \ 0 \ 0) =$

C. $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 6 & 3 & 5 \\ 2 & 9 & 7 \\ 4 & 4 & 2 \end{pmatrix} =$

- 2.

$$\langle i | = (a^* \ b^* \ c^* \ d^*)$$
$$|i\rangle = \begin{pmatrix} a \\ b \\ c \\ d \end{pmatrix}$$
$$\langle i | i \rangle = a^2 + b^2 + c^2 + d^2$$

Normalize $\begin{pmatrix} 6 \\ 2i \\ 5 \\ 1 \end{pmatrix}$

3. Consider the Hermitian matrix:

$$\mathbf{A} = \begin{pmatrix} 4 & 1 & 1 \\ 1 & 7 & -2 \\ 1 & -2 & 7 \end{pmatrix}$$

Is $\begin{pmatrix} 2 \\ -1 \\ -1 \end{pmatrix}$ an eigenvector of \mathbf{A} ? If so, what is its eigenvalue?

4. Find a non-normalized vector that is orthogonal to both $\begin{pmatrix} 2 \\ -1 \\ -1 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}$.