

Physics 451: Homework #9

Due Thursday, Oct 9, 5:00PM, 2008

A.2

A.4

A.8

A.9

A.11 Partial Solution:

$$(\widetilde{\mathbf{S}\mathbf{T}})_{ki} = (\mathbf{S}\mathbf{T})_{ik} = \sum_{j=1}^N \mathbf{S}_{ij} \mathbf{T}_{jk} = \sum_{j=1}^N \tilde{\mathbf{S}}_{ji} \tilde{\mathbf{T}}_{kj} = \sum_{j=1}^N \tilde{\mathbf{T}}_{kj} \tilde{\mathbf{S}}_{ji} = (\tilde{\mathbf{T}}\tilde{\mathbf{S}})_{ki}$$

$$\Rightarrow \widetilde{\mathbf{S}\mathbf{T}} = \tilde{\mathbf{T}}\tilde{\mathbf{S}}$$

A.17 For checking whether $\text{Tr}(\mathbf{T}_1\mathbf{T}_2\mathbf{T}_3)$ equals $\text{Tr}(\mathbf{T}_2\mathbf{T}_1\mathbf{T}_3)$, try the following for a counter

example: $\mathbf{T}_1 = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$, $\mathbf{T}_2 = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$, and $\mathbf{T}_3 = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$.