

Hints for HW of Chapter 8.

Math 463/663
UNLV
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- Sol. ① Easy
② Thm 8.3.
③ Thm 8.6
④ Thm 8.5
⑤ Thm 8.4.

①

8.4. Direct verification. or you can apply Thm 8.2 with $A = A \otimes I$
for (a) and $B = I \otimes B$ for (b).

8.7. Thm 8.1 (8). i.e. $(A \otimes B)' = A' \otimes B'$.

8.8. Thm 8.6. . .

8.9. $A \otimes B$ orthogonal $(\Leftrightarrow) \exists c > 0$, cA & $c^{-1}B$ are orthogonal.

① " \Leftarrow " Easy.

② " \Rightarrow " $(A \otimes B)(A \otimes B)' = AA' \otimes BB' = I_{mn}$.

$\Rightarrow \dots \Rightarrow \dots$

8.15. Thm 8.5.

8.22. Easy.

(2)

8.28. Write out LHS and RHS and compare them.

8.26. Thm 8.11.

Note that for any vector y , $\text{vec}(y) = \text{vec}(y')$

$$\text{So } \text{vec}(AB\vec{e}) = \text{vec}((AB\vec{e})')$$

8.27. C symmetric $\Rightarrow \text{vec}(C) = \text{vec}(C')$.

By Thm 8.12.

$$\text{LHS} = \text{tr}(CBCA')$$

$$\text{RHS} = \text{tr}(\dots)$$

8.33. Write out both LHS and RHS and compare them.

8.35(a) Easy.

(b) Direct computation.

$$8.37. \text{LHS} = \text{tr}((A \circ B)'c) = \text{tr}([\text{vec}(B)]'c) = \sum_{i=1}^m \sum_{j=1}^n a_{ij} b_{ij} c_{ij}$$

Similarly, RHS = = //

Q.39 (a) Apply Thm 8.20 then Thm 8.18.

(b). Due to (a).

(3)