Theory of Matrices, MATH 5090, Summer 2018

Homework 6, Section 3.2

Due Tuesday, June 26 at 1:00

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook or hypotheses.

3.6(2). Prove: **Theorem 3.2.4. Properties of the Kronecker Product.**

Let A, B, C, D be matrices which are conformable for the addition and regular matrix multiplication given below. Then

(2) Distribution of $\otimes$ Over $+$: $(A + B) \otimes C = A \otimes C + B \otimes C$.

3.6(4). Prove: **Theorem 3.2.4. Properties of the Kronecker Product.**

Let A, B, C, D be matrices which are conformable for the addition and regular matrix multiplication given below. Then

(4) Transposition of a Kronecker Product: $(A \otimes B)^T = A^T \otimes B^T$.

3.7. (a) Prove Theorem 3.2.8(7) Schwarz Inequality: For $n \times m$ matrices A and B,

$$|\langle A, B\rangle| \leq \langle A, A\rangle^{1/2} \langle B, B\rangle^{1/2}.$$

3.2.D. Prove parts (5) of **Theorem 3.2.8. Properties of the Inner Product of Matrices**: Let A and B be $n \times m$ matrices. Prove that $\langle A, B\rangle = \mathrm{tr}(A^T B)$.