

# Theory of Matrices, MATH 5090, Summer 2020

## Homework 5, Section 3.2

Due Friday, June 26

**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.

**3.4.** Give conditions on  $a$ ,  $b$ , and  $c$  for the matrix below to be positive definite:  $A = \begin{bmatrix} a & b \\ b & c \end{bmatrix}$ .

HINT: The answer is  $\det(A) > 0$  and  $a > 0$

**3.2.E.** Let  $A = [a_{ij}]$  and  $B = [b_{ij}]$  be  $n \times n$  matrices. Prove that  $\text{tr}(AB) = \text{tr}(BA)$ .

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

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

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

**3.2.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  $\langle A, B \rangle = \text{tr}(A^T B)$ .