

Problem Set 8, Math 54-Lec 3, Linear Algebra, Fall 2017

SEPTEMBER 20TH, 2017

This problem was originally assigned on the homework but I felt it deserved extra emphasis.

Problem 1. Let $M_{2 \times 2}$ be the vector space of all two by two matrices, and define $T : M_{2 \times 2} \rightarrow M_{2 \times 2}$ by $T(A) = A + A^T$.

Part a. Show that T is a linear transformation.

Part b. Let B be any two by two matrix such that $B = B^T$. Find an $A \in M_{2 \times 2}$ such that $T(A) = B$.

Part c. Describe the kernel of T .

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Part d. Show that the range of T is the set of B in $M_{2 \times 2}$ with the property that $B = B^T$.