

Exercise 1.9.2

Linear Algebra MATH 2130

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ABSTRACT. This is Exercise 1.9.2 from Lay [LLM21, §1.9]:

Exercise 1.9.2. Assume that $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ is a linear map (“**transformation**”) such that $T(\mathbf{e}_1) = (1, 3)$, $T(\mathbf{e}_2) = (4, 2)$, and $T(\mathbf{e}_3) = (-5, 4)$, where $\mathbf{e}_1$, $\mathbf{e}_2$, and $\mathbf{e}_3$ are the columns of the standard 3×3 identity matrix. Find the matrix form (“**standard matrix**”) of T .

Solution. The matrix form of T is the matrix with columns given by $T(\mathbf{e}_1) = (1, 3)$, $T(\mathbf{e}_2) = (4, 2)$, and $T(\mathbf{e}_3) = (-5, 4)$; i.e., the matrix form of T is

$$\begin{bmatrix} 1 & 4 & -5 \\ 3 & 2 & 4 \end{bmatrix}.$$

□

REFERENCES

[LLM21] David Lay, Stephen Lay, and Judi McDonald, *Linear Algebra and its Applications*, Sixth edition, Pearson, 2021.

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