

Exercise 1.9.2

Linear Algebra MATH 2130

SEBASTIAN CASALAINA

ABSTRACT. This is Exercise 1.9.2 from Lay [LLM16, §1.9]:

Exercise 1.9.2. Assume that $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ is a linear map (“**transformation**”) such that $T(\mathbf{e}_1) = (1, 3)$, $T(\mathbf{e}_2) = (4, -7)$, 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 $T(\mathbf{e}_1) = (1, 3)$, $T(\mathbf{e}_2) = (4, -7)$, and $T(\mathbf{e}_3) = (-5, 4)$; i.e., the matrix form of T is

$$\begin{bmatrix} 1 & 4 & -5 \\ 3 & -7 & 4 \end{bmatrix}.$$

□

REFERENCES

[LLM16] David Lay, Stephen Lay, and Judi McDonald, *Linear Algebra and its Applications*, Fifth edition, Pearson, 2016.

UNIVERSITY OF COLORADO, DEPARTMENT OF MATHEMATICS, CAMPUS BOX 395, BOULDER, CO 80309

Email address: casa@math.colorado.edu