Exercise 1.3.22

Linear Algebra
MATH 2130

SEBASTIAN CASALAINA

ABSTRACT. This is Exercise 1.3.22 from Lay [LLM21, §1.3]:

Exercise 1.3.22. Construct a 3×3 matrix A, with nonzero entries, and a vector $\mathbf{b}$ in $\mathbb{R}^3$ such that $\mathbf{b}$ is *not* in the set spanned by the columns of A.

Solution. Consider the matrix

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

Then set spanned by the columns of A is the set of vectors of the form $\{(\alpha, \alpha, \alpha) \mid \alpha \in \mathbb{R}\}$. Therefore the vector $\mathbf{b} = (1, 0, 0)$ is not in the set spanned by the columns of A. □

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REFERENCES

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

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