Exercise 6.2.34

Linear Algebra
MATH 2130

SEBASTIAN CASALAINA

ABSTRACT. This is Exercise 6.2.34 from Lay [LLM21, §6.2]:

Exercise 6.2.34. Suppose W is a subspace of $\mathbb{R}^n$ spanned by n nonzero orthogonal vectors. Explain why $W = \mathbb{R}^n$.

Solution. By [LLM21, Thm. 4, p.358], the given n nonzero orthogonal vectors in W are linearly independent. Since these n vectors are also assumed to span W, they form a basis of W. This means that W is a subspace of $\mathbb{R}^n$ of dimension n and, therefore, is equal to $\mathbb{R}^n$. □

Date: November 30, 2025.

REFERENCES

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

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

Email address: casa@math.colorado.edu