

Carefully justify every answer.

Exercise 1

Show that if U, W are subspaces of a vector space V , then $\dim U \cap W \geq \dim U + \dim W - \dim V$.

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Exercise 2 (2.21 p134)

Find a basis for the space of cubic polynomials $p(x) \in \mathcal{P}_3$ such that $p(7) = 0$ and $p(5) = 0$.

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Exercise 3 (3.40 p143)

Prove that a linear system has a solution if and only if the system's matrix of coefficients has the same rank as its augmented matrix.

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Exercise 4 (1.13 p180)

Show that the map $f : \mathcal{P}_1 \rightarrow \mathbb{R}^2$ given by

$$a + bx \mapsto \begin{pmatrix} a-b \\ b \end{pmatrix}$$

is an isomorphism.

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