Practice Problems

MATH2055: Advanced Linear Algebra Tutorial 4

Change of Basis and Commutative Diagrams

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Question 1 - Change of Basis for Polynomials

Find the coordinate vector for $p(t) = 4 - 3t + t^2$ relative to the basis $B = \{1 + x, 1 + x^2, x + x^2\}$.

Question 2 - Commutative Diagrams

Consider the following linear transformation:

$$T : \mathbb{P}_2 \to \mathbb{P}_3$$

$$T : a+bt+ct^2 \mapsto (2a+c)+(a+b+3c)t+(b+2c)t^2+(a+c)t^3$$

Let $A = \{1, 1-t, t^2\}$ be a basis for $\mathbb{P}_2$ and $B = \{1, t, 1-t^2, 1+t^3\}$ be a basis for $\mathbb{P}_3$. Write the appropriate commutative diagram. Find $[I]_{S \leftarrow A}$, $[T]_{S \leftarrow S}$ and $[I]_{B \leftarrow S}$. Multiply to find $[T]_{A \leftarrow B}$.