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T 相對於 β 和 γ 的矩陣表示

$$[T]_{\gamma}^{\gamma} [v]_{\gamma} = [T(v)]_{\gamma}$$

$$\Rightarrow \text{原來的: } [T]_{\beta}^{\gamma} [v]_{\beta} = [T(v)]_{\gamma}$$

$$[v]_{\beta} = [I]_{\gamma}^{\beta} [v]_{\gamma}$$

* $[T]_{\gamma}^{\gamma}$ 簡記 $[T]_{\gamma}$

$$[T]_{\beta}^{\gamma} = [T]_{\gamma}^{\gamma} [I]_{\beta}^{\gamma} = [I]_{\beta}^{\gamma} [T]_{\beta}^{\beta} \Rightarrow \beta, \gamma \text{ 為同一個空間}$$

$[T]_{\gamma}^{\gamma} \Rightarrow$ the matrix representation for T with respect to γ . $[T]_{\gamma}^{\gamma} = [I]_{\beta}^{\gamma} [T]_{\beta}^{\beta} [I]_{\gamma}^{\beta}$

$$\text{ex: } T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$$

$$T \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 11a + 3b \\ -5a - 5b \end{bmatrix}, \gamma = \left\{ \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix} \right\}$$

find $[T]_{\gamma}$:

假設 $\beta = \left\{ \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix} \right\}$ 為 \mathbb{R}^2 的一組基底,

$$[T]_{\beta} = \begin{bmatrix} 11 & 3 \\ -5 & -5 \end{bmatrix}, [I]_{\gamma}^{\beta} = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}, [I]_{\beta}^{\gamma} = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}^{-1}$$

$$[T]_{\gamma} = [I]_{\beta}^{\gamma} [T]_{\beta} [I]_{\gamma}^{\beta} = ([I]_{\gamma}^{\beta})^{-1} [T]_{\beta} [I]_{\gamma}^{\beta} \neq$$

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standard basis example

$$I^{2 \times 2} \Rightarrow \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\}$$

$$f(x) \Rightarrow \{1, x, x^2\}$$

$$ax^2 + bx + c$$