

# 判斷線性獨立集

## 86 台大資工

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題目

Let  $W = \{v_1, v_2, \dots, v_k\} \subseteq \mathbf{R}^n$ ,  $A \in \mathbf{R}^{n \times n}$ , If  $\{Av_1, Av_2, \dots, Av_k\}$  is a linearly independent set, then  $W$  is a linearly independent set.

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解:

題目說  $\{Av_1, Av_2, \dots, Av_k\}$  為線性獨立集，

則純在  $k$  個純量都為 0 視為唯一解

$$\Rightarrow \alpha_1 Av_1 + \alpha_2 Av_2 + \dots + \alpha_k Av_k = 0, \alpha_1 = \alpha_2 = \dots = \alpha_k = 0$$

$$\Rightarrow (\alpha_1 A)v_1 + (\alpha_2 A)v_2 + \dots + (\alpha_k A)v_k = 0$$

$$\Rightarrow 0 \cdot v_1 + 0 \cdot v_2 + \dots + 0 \cdot v_k = 0$$

所以  $\{v_1, v_2, \dots, v_k\}$  為線性獨立集。