$$v_1 \qquad v_2 \qquad v_3$$

$$\begin{pmatrix} 1 \\ 0 \\ 0 \\ 1 \end{pmatrix} \qquad \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} \qquad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} \subseteq \mathbb{R}^4$$

$$\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \qquad \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$$

$$v_1 = \alpha_2 v_2 + \alpha_3 v_3$$

$$-1 v_1 + \alpha_2 v_2 + \alpha_3 v_3 = 0$$

<u>Definition</u> The set of generators $v_1, v_2, \ldots, v_n$ is called

<u>linearly dependent</u>

if there exist $\alpha_1, \alpha_2, \alpha_3, \ldots, \alpha_n$ with at least one $\alpha_i \neq 0$

such that

$$\alpha_1 v_1 + \alpha_2 v_2 + \cdots + \alpha_n v_n = 0$$

<u>Opposite:</u> <u>linearly independent</u> ← good thing

<u>Definition</u> A linearly independent set of generators is called

a basis.

v_1, v_2, v_3, v_4 l.i.

$\hookrightarrow v_1, v_2, v_3$ l.i.?

$v_1, v_2, v_3, \cdots, v_n$ l.d.