ex. $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = x\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + y\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} + z\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$

$= x e_1 + y e_2 + z e_3$

$\rightarrow \mathbb{R}^3 = \text{span}(e_1, e_2, e_3)$

ex. Find the span of $\begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}$ & $\begin{bmatrix} -1 \\ 1 \\ -3 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = s\begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix} + t\begin{bmatrix} -1 \\ 1 \\ -3 \end{bmatrix}$$

$$\left[\begin{array}{cc|c} 1 & -1 & x \\ 0 & 1 & y \\ 3 & -3 & z \end{array}\right] \rightarrow \begin{bmatrix} 1 & -1 & x \\ 0 & 1 & y \\ 0 & 0 & z-3x \end{bmatrix}$$

$\rightarrow z - 3x = 0,$

- Linear Independence

Def. A set of vectors $v_1, \cdots, v_k$ is linearly dependent if there are scalars $c_1, \cdots, c_k$,