

Definition

We say that vectors x, y, z are **linearly independent** if, whenever $ax + by + cz = 0$, we have $a = b = c = 0$.

- Said another way,

$$\forall a, b, c \in \mathbb{R}, ax + by + cz = 0 \implies a = b = c = 0.$$

- Negating this gives

$$\exists a, b, c \in \mathbb{R}, ax + by + cz = 0 \wedge \neg(a = b = c = 0)$$

and

- $\neg(a = b = c = 0)$ means *some of* a, b, c are nonzero.

Definition

We say that x, y, z are **linearly dependent** if there exists a, b, c , not all zero, such that $ax + by + cz = 0$.