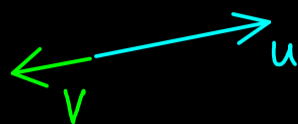
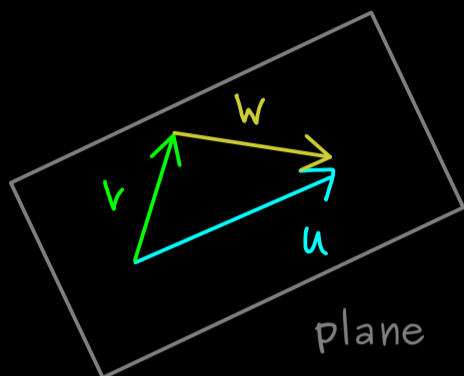


Linear Algebra - Part 22

 \mathbb{R}^2 :colinear: $u = \lambda v$ \mathbb{R}^3 :coplanar: $u = \lambda v + \mu w$

$$\Leftrightarrow 0 = (-1)u + \lambda v + \mu w$$

Definition: Let $v^{(1)}, v^{(2)}, \dots, v^{(k)} \in \mathbb{R}^n$. The family $(v^{(1)}, v^{(2)}, \dots, v^{(k)})$ (or $\{v^{(1)}, v^{(2)}, \dots, v^{(k)}\}$) is called linearly dependent if there are $\lambda_1, \lambda_2, \dots, \lambda_k \in \mathbb{R}$

that are not all equal to zero such that:

$$\sum_{j=1}^k \lambda_j v^{(j)} = 0 \quad \leftarrow \text{zero vector in } \mathbb{R}^n$$

We call the family linearly independent if

$$\sum_{j=1}^k \lambda_j v^{(j)} = 0 \quad \Rightarrow \quad \lambda_1 = \lambda_2 = \lambda_3 = \dots = 0$$