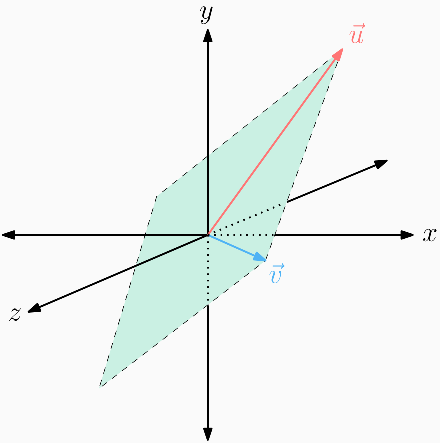
# Subspaces

Similarily, any non-zero vector in $\mathbb{R}^3$ also spans a line going through the origin. In addition, any two linearly independent vectors span a **plane** going through the origin.

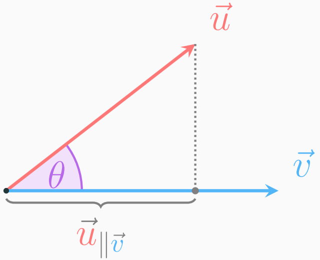


# The Dot Product

If we rotate the two vectors such that one of them lies on the horizontal direction, we can draw a perpendicular line from $\vec{u}$ to $\vec{v}$. Using trigonometry we get

$$\cos(\theta) = \frac{\vec{u}_{\|\vec{v}}}{\|\vec{u}\|},$$

where $\vec{u}_{\|\vec{v}}$ is the length of the projection of $\vec{u}$ on $\vec{v}$.



# The Cross Product