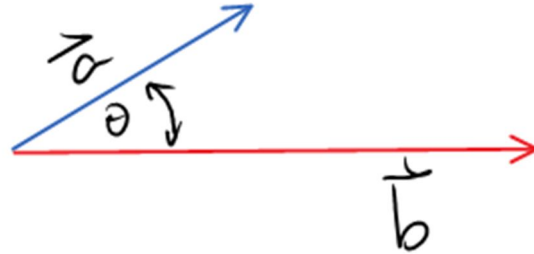


7.5 Projections: Scalar and Vector

Scalar Projections

Consider the vector diagram:



Notation: The “amount of $\vec{a}$ -ness” along the direction of $\vec{b}$ is called

Now, we know that $\vec{a} \cdot \vec{b} = \|\vec{a}\| \|\vec{b}\| \cos(\theta)$, and so we can write

Example 7.5.1

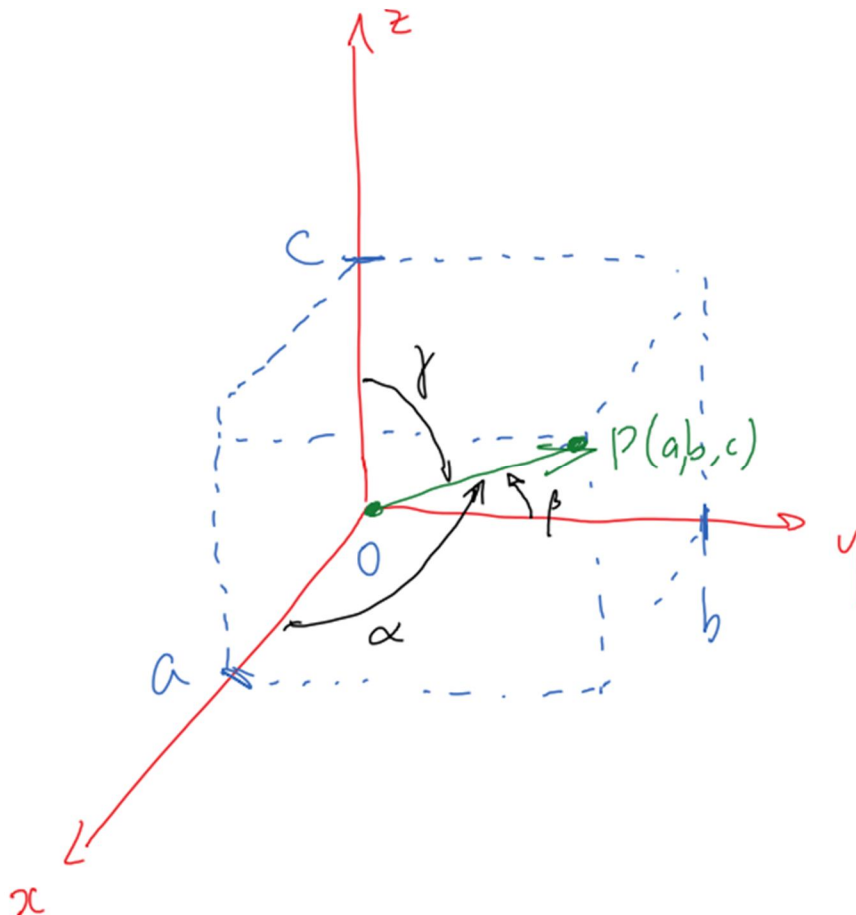
Given $\vec{a} = (1, 2, 3)$ and $\vec{b} = (-2, 1, 4)$ determine the scalar projections of:

a) $\vec{a}$ on $\vec{b}$

b) $\vec{b}$ on $\vec{a}$

Direction Cosines

Sometimes, especially in $\mathbb{R}^3$, the idea of “direction” is difficult to pin down (or better – direction can be difficult to describe mathematically). Consider the sketch of a position vector in $\mathbb{R}^3$.



Example 7.5.2

Given $\vec{u} = (3, -2, 1)$ determine the angle $\vec{u}$ makes with the x -axis and the y -axis to the nearest degree.

Class/Homework for Section 7.5

Pg. 398 – 400 #3, 4, 6 (scalar only), 7 (scalar only)