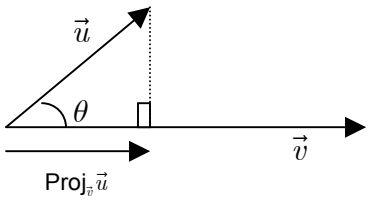
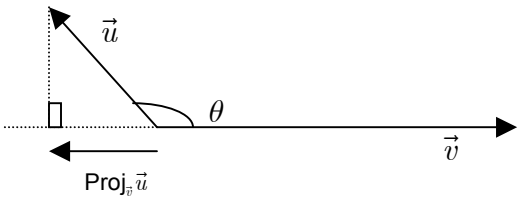
PROJECTIONS

1.

$\text{Proj}_{\vec{v}}\vec{u}$:



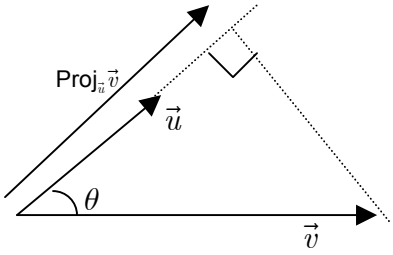
θ acute



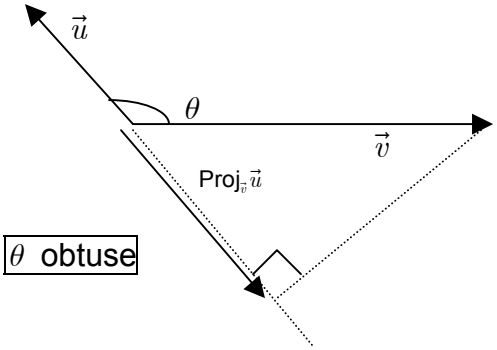
θ obtuse

$\text{Proj}_{\vec{v}}\vec{u} = \left(\frac{\vec{u}\bullet\vec{v}}{\|\vec{v}\|^2}\right)(\vec{v}) = \overrightarrow{w_1}$; component of $\vec{u} \perp \vec{v} = \overrightarrow{w_2} = \vec{u} - \overrightarrow{w_1} = \vec{u} - \text{Proj}_{\vec{v}}\vec{u}$

$\text{Proj}_{\vec{u}}\vec{v}$:



θ acute



θ obtuse

$\text{Proj}_{\vec{u}}\vec{v} = \left(\frac{\vec{u}\bullet\vec{v}}{\|\vec{u}\|^2}\right)(\vec{u})$; component of $\vec{v} \perp \vec{u} = \vec{v} - \text{Proj}_{\vec{u}}\vec{v}$

Ex 3.3 – 4, 5, 6

2.

Area of a Δ using the Cross Product.

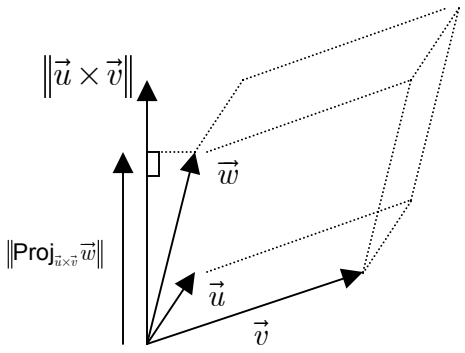
Area of a parallelogram using the Cross Product.

$\|\vec{u}\times\vec{v}\|^2 = \|\vec{u}\|^2 \ \|\vec{v}\|^2 - (\vec{u}\bullet\vec{v})^2$ (Lagrange Identity)

$\Rightarrow \|\vec{u}\times\vec{v}\| = \|\vec{u}\| \ \|\vec{v}\| \ \sin\theta$

Ex 3.4 – 3, 4, 8, 9, 16, 17

3. Volume of a parallelepiped



V = (area of BASE) (perpendicular height)

= $\|\vec{u}\times\vec{v}\| = \|\text{Proj}_{\vec{u}\times\vec{v}}\vec{w}\|$

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= absolute value of _____

Ex 3.4 - 10

4. Distances

Ex 3.4 – 19 ; Ex 3.5 – 39, 40