Introduction to Vectors

Given: $\vec{u}=(a,b),\ \vec{v}=(c,d)$

$\left\|\vec{u}\right\|^2=a^2+b^2$ ……Norm of a vector

$\vec{u}+\vec{v}=(a+c,b+d)$ …… Vector Addition

$\vec{u}\bullet\vec{v}=ac+bd$ …… Scalar product

$\vec{u}\bullet\vec{v}=\left\|\vec{u}\right\|\times\left\|\vec{v}\right\|\times\cos\theta$ …… Scalar Product

Given: $\left\|\vec{u}\right\|=n, angle\theta$

$\overrightarrow{u_x}=n\times\cos\theta$ …… X-component

$\overrightarrow{u_y}=n\times\sin\theta$ …… Y-component

Properties of Vectors

$\vec{u}+\vec{v}=\vec{v}+\vec{u}$ …… Commutativity of Addition

$\vec{u}+\left(\vec{v}+\vec{w}\right)=\left(\vec{u}+\vec{v}\right)+\vec{w}$ …… Associativity of Addition

$k\left(\vec{u}+\vec{v}\right)=k\vec{u}+k\vec{v}$ …… Distributivity of Multiplication

$k_1\left(k_2\vec{u}\right)=\left(k_1k_2\right)\vec{u}$ …… Associativity of Multiplication

$\overrightarrow{AB}+\overrightarrow{BC}=\overrightarrow{AC}$ …… Chasles' Principle

Miscellaneous

$c^2=a^2+b^2-2ab\cos C$

$b^2=a^2+c^2-2ac\cos B$

$a^2=b^2+c^2-2bc\cos A$

$$\frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}$$