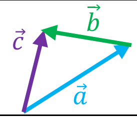
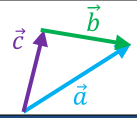
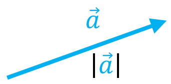
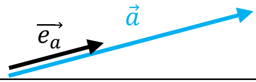
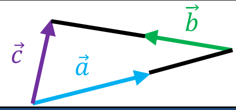
VEKTOROPERATIONEN

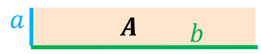
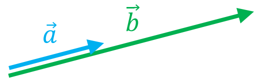
Strichoperationen

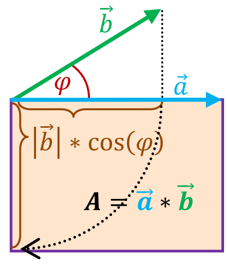
Addition	$\vec{a}+\vec{b}=\vec{c}$ $(Vektor)$	$\begin{pmatrix} a_x+b_x \\ a_y+b_y \\ a_z+b_z \end{pmatrix} = \begin{pmatrix} c_x \\ c_y \\ c_z \end{pmatrix}$	
Subtraktion (Addition des Gegenvektors)	$\vec{a}-\vec{b}=\vec{a}+(-\vec{b})=\vec{c}$ $(Vektor)$	$\begin{pmatrix} a_x-b_x \\ a_y-b_y \\ a_z-b_z \end{pmatrix} = \begin{pmatrix} c_x \\ c_y \\ c_z \end{pmatrix}$	

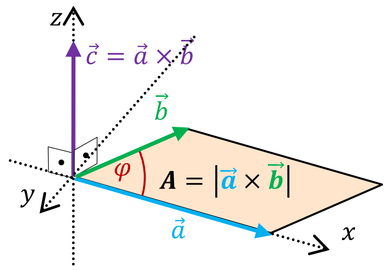
Sonstiges Operationen

Betrag `norm(a)`	$\lvert\vec{a}\rvert = \sqrt{a_x{}^2+a_y{}^2+a_z{}^2}$ $(Skalar)$		
Einheitsvektor `a/norm(a)`	$\vec{e_a} = \frac{\vec{a}}{\lvert\vec{a}\rvert}$	$\vec{a} = a_x * \vec{e_x} + a_y * \vec{e_y} + a_z * \vec{e_z}$	
Linearkombin.	$\vec{c} = \lambda * \vec{a} + \mu * \vec{b}$	$\begin{vmatrix} c_x = \lambda * a_x + \mu * b_x \\ c_y = \lambda * a_y + \mu * b_y \end{vmatrix}$	

Punktoperationen

Multiplikation & Division	$a*b=A$ $\quad a/b$ $(Skalar)$		
Multiplikation & Division mit Skalar	$\lambda*\vec{a}=\vec{b}$ $\quad \vec{a}/\lambda=\vec{b}$ $(Vektor)$	$\vec{b} = \begin{pmatrix} a_x*\lambda \\ a_y*\lambda \\ a_z*\lambda \end{pmatrix}$ $\quad \vec{b} = \begin{pmatrix} a_x/\lambda \\ a_y/\lambda \\ a_z/\lambda \end{pmatrix}$	

Skalarprodukt
`dot(a,b)`
`linalg::scalarProduct(a,b)`
	$\vec{a}*\vec{b}=A$
	$(Skalar)$
	$\vec{a}*\vec{b}=\lvert\vec{a}\rvert*\lvert\vec{b}\rvert\cos\varphi$
		$\vec{a}*\vec{b}=a_xb_x+a_yb_y+a_zb_z$
		projizierte Fläche: $A=\vec{a}*\vec{b}$
		Projektion von b auf a: $\vec{b_a}=\lvert\vec{b}\rvert\cos(\varphi)\,\vec{e_a}$
		rechtwinklig: $\vec{a}*\vec{b}=0$
		Länge ist 1: $\vec{a}*\vec{a}=1$
		Zwischenwinkel: $\varphi=\cos^{-1}\frac{\vec{a}*\vec{b}}{\lvert\vec{a}\rvert*\lvert\vec{b}\rvert}$
			

Vektorprodukt / Kreuzprodukt
`cross(a,b)`
`linalg::crossProduct(a,b)`
	$\vec{a}\times\vec{b}=\vec{c}$
	$(Vektor)$
	$\lvert\vec{a}\times\vec{b}\rvert=\lvert\vec{a}\rvert*\lvert\vec{b}\rvert\sin\varphi$
		$c_x: \begin{vmatrix} a_x & b_x \\ a_y & b_y \\ a_z & b_z \end{vmatrix}$ $\quad c_y: \begin{vmatrix} a_x & b_x \\ a_y & b_y \\ a_z & b_z \end{vmatrix}$ $\quad c_z: \begin{vmatrix} a_x & b_x \\ a_y & b_y \\ a_z & b_z \end{vmatrix}$
		3ter Vektor Normale d. Ebene: $\vec{c}=\vec{a}\times\vec{b}$
		kollinear: $\lvert\vec{a}\times\vec{b}\rvert=0$
		Zwischenwinkel: $\varphi=\sin^{-1}\frac{\lvert\vec{a}\times\vec{b}\rvert}{\lvert\vec{a}\rvert*\lvert\vec{b}\rvert}$
		Parallelogramm: $A=\lvert\vec{a}\times\vec{b}\rvert$
			

Spatprodukt / Determinante
`det([a;b;c])`
`det(A)`
	$[\vec{a}\,\vec{b}\,\vec{c}]=Volumen$
	$(Vektor)$
	$[\vec{a}\,\vec{b}\,\vec{c}]=\vec{a}(\vec{b}\times\vec{c})$
	$=\lvert\vec{a}\rvert*\lvert\vec{b}\times\vec{c}\rvert\cos\varphi$
		$[\vec{a}\,\vec{b}\,\vec{c}] = \begin{vmatrix} a_x & b_x & c_x & a_x & b_x \\ a_y & b_y & c_y & a_y & b_y \\ a_z & b_z & c_z & a_z & b_z \end{vmatrix}$
		Volumen: $V=\lvert[\vec{a}\,\vec{b}\,\vec{c}]\rvert$
		komplanar: $[\vec{a}\,\vec{b}\,\vec{c}]=0$