Lecture 5

Tuesday, January 11, 2022 10:56 PM

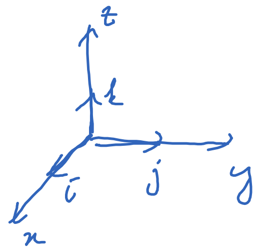
* Prayer

* Spiritual thought

Cross product $v \times w$ { perp. to both v and w; directed by right hand rule; length = area of parallelogram } (geometrically)

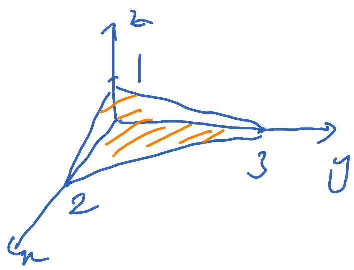
$$v \times w = \langle | \dots |, | \dots |, | \dots | \rangle$$ (algebraically)

Ex



$k = i \times j$

Ex



Area = ?

Ex

Equation of plane passing through

$A(1,2,3)$

$B(2,3,1)$

$C(-1,1,0)$

If a plane passes through $A(x_0, y_0, z_0)$ and has normal vector $n = \langle a, b, c\rangle$ then the plane has the eq.

$$a(x-x_0) + b(y-y_0) + c(z-z_0) = 0$$

* Triple product: $a\cdot(b\times c) = \det\begin{pmatrix} a \\ b \\ c \end{pmatrix} = \det\begin{pmatrix} | & | & | \\ a & b & c \\ | & | & | \end{pmatrix}$.

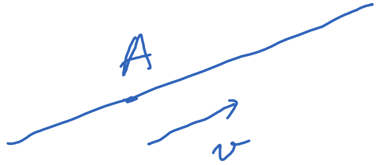
$|a\cdot(b\times c)| =$ volume of parallelepiped.

Check if 4 points are coplanar.

Ex

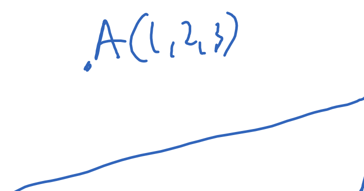
$A(1,2,1)$	$\vec{AB} = \langle 1,-1,0\rangle$	Check $\vec{AB}\cdot(\vec{AC}\times\vec{AD})$
$B(2,1,1)$	$\vec{AC} = \langle -2,-1,-1\rangle$	
$C(-1,1,0)$	$\vec{AD} = \langle -1,-1,-1\rangle$	
$D(0,1,0)$		

* Eq. of lines:



$$\begin{cases} x = x_0 + at \\ y = y_0 + bt \\ z = z_0 + ct \end{cases}$$ parametric eq.

* Eq of a plane passing through a point and a line.



$$l : \begin{cases} x = 1 - t \\ y = t \\ z = 2 + 3t \end{cases}$$