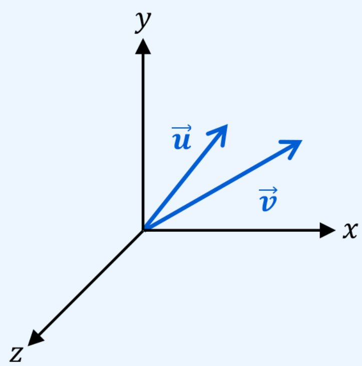
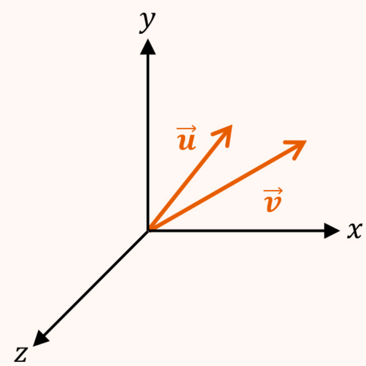
TOPIC: CROSS PRODUCT

Computing the Cross Product

◆ Like the dot product, the **cross product** is a way to ____________ vectors.

Recall Dot Product	**New** Cross Product
	
	ALWAYS ______________ to original vectors
$\vec{u}\cdot\vec{v}$ = [SCALAR | VECTOR]	$\vec{u}\times\vec{v}$ = [SCALAR | VECTOR]

EXAMPLE Find the cross product, $\vec{w}=\vec{u}\times\vec{v}$.

$\vec{u}=\langle 2,0,1\rangle \quad \vec{v}=\langle 0,-1,2\rangle$

	$\hat{i}$	$\hat{j}$	$\hat{k}$		
				___	___
$\vec{u}$	___	___	___	___	___
$\vec{v}$	___	___	___	___	___

$w_x = u\_v\_ - v\_u\_ =$ _______________ = ____

$w_y =$ _______________ = _______________ = ____

$w_z =$ _______________ = _______________ = ____

$\vec{w}$ = (____) $\hat{i}$ + (____) $\hat{j}$ + (____) $\hat{k}$

HOW TO: Calculate Cross Product

1) Write matrix of each vector's $\hat{i},\hat{j},\hat{k}$ components

2) Repeat $\hat{i},\hat{j}$ columns outside matrix

For each $\vec{w}$ component:

3) Write $u\,v - v\,u$

4) Multiply "_______" components diagonally (╳) " ______ "

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PRACTICE If vectors $\vec{v} = \langle 3,1,0 \rangle$, $\vec{u} = \langle 0,-2,0 \rangle$ and $\vec{w} = \vec{v} \times \vec{u}$, find $\vec{w}$.

	$\hat{\imath}$	$\hat{\jmath}$	$\hat{k}$	$\hat{\imath}$	$\hat{\jmath}$
$\vec{v}$	___	___	___	___	___
$\vec{u}$	___	___	___	___	___

PRACTICE If vectors $\vec{a} = 5\hat{\imath}$, $\vec{b} = 12\hat{k}$ and $\vec{c} = \vec{a} \times \vec{b}$, find $\vec{c}$.