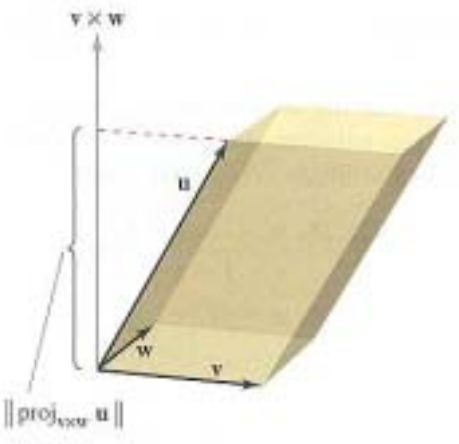
Ex. Find the volume of a parallelepiped having the following vectors as adjacent edges:

$$\mathbf{u} = \langle 3, -5, 1 \rangle \qquad \mathbf{v} = \langle 0, 2, -2 \rangle \qquad \mathbf{w} = \langle 3, 1, 1 \rangle$$

Recall $|\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w})|$ = the volume of a parallelepiped have **u**, **v** & **w** as adjacent edges



The triple scalar product can be found using:

$$\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w}) = \begin{vmatrix} u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \\ w_1 & w_2 & w_3 \end{vmatrix}$$

➔ $$|\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w})| = \begin{vmatrix} 3 & -5 & 1 \\ 0 & 2 & -2 \\ 3 & 1 & 1 \end{vmatrix}$$

$= | 6 - (-6) + 30 - 0 + 0 - 6 |$

$= | 12 + 30 - 6 |$

$= 36$

NOTE: *We have used the absolute value because the value of a determinant could be negative, but volumes are always positive.*