B:(10 pts) Cross Product

Consider the two vectors: $\vec{U} = 3\hat{\imath} - 2\hat{\jmath}$, and $\vec{V} = 6\hat{\imath} + 4\hat{\jmath}$. Find their cross product $\vec{W} = \vec{U} \times \vec{V}$, and the angle θ_{UV} between them.

- $(2pts)$ $W_x =$_____
- $(2pts)$ $W_y =$_____
- $(2pts)$ $W_z =$_____
- $(4pts)$ $\theta_{UV} =$_____ *(accurate to .01°)*

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- $(2pts)\ W_x =$ 0
- $(2pts)\ W_y =$ 0
- $(2pts)\ W_z =$ 24
- $(4pts)\ \theta_{UV} =$ 67.38° *(accurate to .01°)*

$$U = \sqrt{3^2+(-2)^2} = \sqrt{13}$$
$$V = \sqrt{6^2+4^2} = \sqrt{52}$$
$$W = 24$$

$$\vec{U}\times\vec{V} = (3\hat{\imath}-2\hat{\jmath})\times(6\hat{\imath}+4\hat{\jmath})$$
$$= 0 + 12\hat{k} + (-12)(-\hat{k}) + 0$$
$$= \underline{24\hat{k}}$$

$$W = UV\sin\theta \Longrightarrow \sin\theta = \frac{W}{UV} = \frac{24}{\sqrt{676}} = \frac{24}{26}$$
$$\theta = \underline{67.3801^\circ}$$