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MAC 2313 Quiz 3
Tuesday January 23rd

Find a unit vector that is perpendicular to both $\langle 3, 0, -1 \rangle$ and $\langle 0, 2, -1 \rangle$.

We can get a perpendicular vector using cross product.

If $\vec{u} = \langle 3, 0, -1 \rangle$ and $\vec{v} = \langle 0, 2, -1 \rangle$

$$\text{then } \vec{u} \times \vec{v} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & 0 & -1 \\ 0 & 2 & -1 \end{vmatrix} = \langle 0 - (-2), 0 - (-3), 6 - 0 \rangle \\ = \langle 2, 3, 6 \rangle \text{ is perpendicular to both } \vec{u} \text{ and } \vec{v}$$

To get the desired unit vector, notice $\sqrt{2^2 + 3^2 + 6^2}$
 $= \sqrt{4 + 9 + 36} = \sqrt{49} = 7$

So the desired unit vector is $\frac{1}{7} \langle 2, 3, 6 \rangle$ or $\left\langle \frac{2}{7}, \frac{3}{7}, \frac{6}{7} \right\rangle$