

$$\begin{aligned}
 \vec{v}_1 \times \vec{v}_2 &= \begin{pmatrix} x_1 \\ y_1 \\ z_1 \end{pmatrix} \times \begin{pmatrix} x_2 \\ y_2 \\ z_2 \end{pmatrix} = \begin{pmatrix} y_1 z_2 - z_1 y_2 \\ z_1 x_2 - x_1 z_2 \\ x_1 y_2 - y_1 x_2 \end{pmatrix}
 \end{aligned}$$

Diagram illustrating the cross product of two vectors  $\vec{v}_1$  and  $\vec{v}_2$ . The resulting vector is shown in purple, pointing upwards. The components of the resulting vector are labeled with the determinant formula:  $y_1 z_2 - z_1 y_2$ ,  $z_1 x_2 - x_1 z_2$ , and  $x_1 y_2 - y_1 x_2$ .

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