

$$\begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix} \times \begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix} = \begin{pmatrix} v_2 \cdot w_3 - v_3 \cdot w_2 \\ v_3 \cdot w_1 - v_1 \cdot w_3 \\ v_1 \cdot w_2 - v_2 \cdot w_1 \end{pmatrix}$$

Diagram illustrating the cross product of two vectors $\begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix}$ and $\begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix}$. The result is a vector whose components are the determinants of the 2×2 submatrices formed by the components of the two vectors.

The components of the resulting vector are:

- First component: $v_2 \cdot w_3 - v_3 \cdot w_2$ (indicated by red arrows from v_2 to w_3 and v_3 to w_2)
- Second component: $v_3 \cdot w_1 - v_1 \cdot w_3$ (indicated by black arrows from v_3 to w_1 and v_1 to w_3)
- Third component: $v_1 \cdot w_2 - v_2 \cdot w_1$ (indicated by black arrows from v_1 to w_2 and v_2 to w_1)