

Parallel and Perpendicular Vectors

Dr. William J. Larson - <http://MathsTutorGeneva.ch/>

To prove that two non-zero vectors \vec{A} and \vec{B} are parallel,

Show $\vec{A} = k\vec{B}$, where k is a scalar.

Example

$$\vec{a} = \begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} -9 \\ 6 \\ -15 \end{pmatrix}; \quad \vec{a} \text{ is parallel to } \vec{b}, \text{ because } \vec{b} = -3\vec{a}$$

To prove that two non-zero vectors \vec{A} and \vec{B} are perpendicular:

Show $\vec{A} \cdot \vec{B} = 0$

Example

$$\vec{a} = \begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} 2 \\ 3 \\ 0 \end{pmatrix}; \quad \vec{a} \text{ is perpendicular to } \vec{b}, \text{ because } \vec{a} \cdot \vec{b} = 6 - 6 + 0 = 0$$