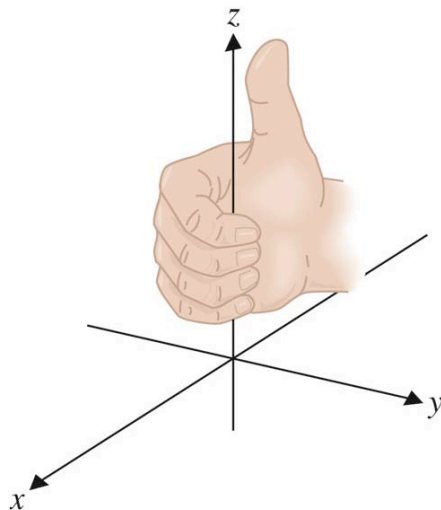


MAPLE. See [vectorsinplane\(10.1\).mw](#) or [vectorsinplane\(10.1\).pdf](#)

2. Vectors in Space

We use a right-handed coordinate system.



The coordinate system has 8 octants. The first octant has $x > 0, y > 0, z > 0$.

Distance Formula

$$d\{(x_1, y_1, z_1), (x_2, y_2, z_2)\} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}.$$

Vectors in \mathbb{R}^3

These are similar to vectors in \mathbb{R}^2 , with one more dimension.

$$V_3 = \{\langle x, y, z \rangle \mid x, y, z \in \mathbb{R}\}$$

is a vector space with

$$\mathbf{a} + \mathbf{b} = \langle a_1, a_2, a_3 \rangle + \langle b_1, b_2, b_3 \rangle = \langle a_1 + b_1, a_2 + b_2, a_3 + b_3 \rangle,$$

$$c\mathbf{a} = c\langle a_1, a_2, a_3 \rangle = \langle ca_1, ca_2, ca_3 \rangle, \text{ and}$$

$$\mathbf{a} - \mathbf{b} = \langle a_1, a_2, a_3 \rangle - \langle b_1, b_2, b_3 \rangle = \langle a_1 - b_1, a_2 - b_2, a_3 - b_3 \rangle,$$