

## 12.2 Videos Guide

### 12.2a

- Vector from  $P(x_1, y_1, z_1)$  to  $Q(x_2, y_2, z_2)$   
(coordinates of terminal point) – (coordinates of initial point)
  - $\mathbf{a} = \langle x_2 - x_1, y_2 - y_1, z_2 - z_1 \rangle$

### 12.2b

- Vector arithmetic: let  $\mathbf{a} = \langle a_1, a_2, a_3 \rangle$ ,  $\mathbf{b} = \langle b_1, b_2, b_3 \rangle$ , and  $c$  be a real number
  - Scalar multiplication:  $c\mathbf{a} = \langle ca_1, ca_2, ca_3 \rangle$

### 12.2c

- Addition/subtraction:  $\mathbf{a} \pm \mathbf{b} = \langle a_1 \pm b_1, a_2 \pm b_2, a_3 \pm b_3 \rangle$

### 12.2d

- Magnitude of a vector  $\mathbf{a} = \langle a, b, c \rangle$ 
  - $|\mathbf{a}| = \sqrt{a^2 + b^2 + c^2}$
- Standard basis vectors for  $V_3$ 
  - $\mathbf{i} = \langle 1, 0, 0 \rangle$
  - $\mathbf{j} = \langle 0, 1, 0 \rangle$
  - $\mathbf{k} = \langle 0, 0, 1 \rangle$

Exercise:

- Find a unit vector that has the same direction as the vector  $-5\mathbf{i} + 3\mathbf{j} - \mathbf{k}$ .