Multivariable Calculus

Point in space 3D.

(x, y, z)

Ex $(2,2,1)$ Leader $(4,2,3)$ Ghost

$(1,6,1)$ Door.

Vector $\langle 1,1,1 \rangle$

Point (x_1, y_1, z_1) to (x_2, y_2, z_2)

Vector $\langle x_2-x_1, y_2-y_1, z_2-z_1 \rangle$

Door to Ghost $\langle 4-1, 2-6, 3-1 \rangle$

$\langle 3, -4, 2 \rangle$

Head to Ghost
Head to Door

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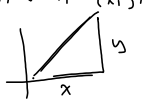
Vector Magnitude $\|\vec{v}\|$ $\vec{v}$ $\mathbf{v}$



$v = \langle x, y, z \rangle$

$\|\vec{v}\| = \sqrt{x^2+y^2+z^2}$

$\vec{HG}$ $\vec{HD}$

Vector operations
add, subtract, Dot product

$\langle x_1, x_2 \rangle \cdot \langle y_1, y_2 \rangle$
$x_1 \cdot y_1 + x_2 \cdot y_2$ = scalar

Ex $\langle 1,2 \rangle \cdot \langle 3,4 \rangle$
$3+8 = 11$

Find $\vec{HG} \cdot \vec{HD}$

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Angle between Vectors. θ

$$\cos\theta = \frac{\vec{a} \cdot \vec{b}}{\|\vec{a}\| \|\vec{b}\|}$$

$$\theta = \cos^{-1}\left(\frac{\vec{HG} \cdot \vec{HD}}{\|\vec{HG}\| \cdot \|\vec{HD}\|}\right)$$

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