

Class Discussion

Unit 6 Topic 4 Part 1 Dot Product

Objective: understand dot product and orthogonality

1. Definition: dot product of \vec{u} and \vec{v}

If $\vec{u} = \langle u_1, u_2 \rangle$ and $\vec{v} = \langle v_1, v_2 \rangle$ then $\vec{u} \cdot \vec{v} = u_1 v_1 + u_2 v_2$

2. θ between \vec{u} and \vec{v} can be found by $\cos \theta = \frac{\vec{u} \cdot \vec{v}}{\|\vec{u}\| \|\vec{v}\|}$

3. \vec{u} and \vec{v} are orthogonal if $\vec{u} \cdot \vec{v} = 0$ (u and v are perpendicular)

Ex1: Given $\vec{u} = \langle 2, 3 \rangle$ and $\vec{v} = \langle 3, -1 \rangle$, find the angle between \vec{u} and \vec{v}

Ex2: prove θ between \vec{u} and \vec{v} can be found by $\cos \theta = \frac{\vec{u} \cdot \vec{v}}{\|\vec{u}\| \|\vec{v}\|}$

Ex3: Classify $\triangle ABC$ into (acute, right or obtuse) triangle, if $A(-2, 5)$, $B(3, -3)$ and $C(2, 4)$.