

Name: _____ Date: 11/17/25

Session 15

Dot product reminders!!!

If you have $\vec{a} = \langle a_1, a_2 \rangle$ and $\vec{b} = \langle b_1, b_2 \rangle$,

then your formula is

$$\vec{a} \cdot \vec{b} = (a_1 b_1) + (a_2 b_2)$$

Your answer should just
be a number, not a
vector!

If you have an angle between $\vec{a}$ and $\vec{b}$, then

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

If $\vec{a}$ and $\vec{b}$ are perpendicular (orthogonal),
then and only then,

$$\vec{a} \cdot \vec{b} = 0$$

↑
regular
zero

properties of dot product

$$\vec{u} \cdot \vec{v} = \vec{v} \cdot \vec{u}$$

$$(c\vec{u}) \cdot \vec{v} = c(\vec{u} \cdot \vec{v}) = \vec{u} \cdot (c\vec{v})$$

$$(\vec{u} + \vec{v}) \cdot \vec{w} = \vec{u} \cdot \vec{w} + \vec{v} \cdot \vec{w} \quad |\vec{u}|^2 = \vec{u} \cdot \vec{u}$$

1. Determine the Dot product of the two vectors and the angle between them!

$$\vec{a} = 3\mathbf{i} + 4\mathbf{j}$$

$$\vec{b} = 5\mathbf{i} - 2\mathbf{j}$$

2. A forklift moves 34 m, carrying a 1032 N box across the floor. How much work is being done by the forklift?

partial fraction decomposition

3. Write the form of the partial fraction decomposition. Do not determine the numerical value of the coefficients

a) $\frac{1}{(x-1)(x+2)}$

b) $\frac{x^2 - 3x + 5}{(x-2)^2(x+4)}$

c) $\frac{x^3 - 4x^2 + 2}{(x^2+1)(x^2+2)}$

4. Write the form of the partial fraction decomposition. Now, determine the values of the coefficients

$$a) \frac{2}{(x-1)(x+1)}$$

$$b) \frac{x+14}{x^2-2x-8}$$

Extra paper!!