Sec. 6.7: Dot Product

Dot Product: Given 2 vectors in component form,

u = $< x_1 , y_1 >$ and **v** = $< x_2 , y_2 >$, their dot product is:

$$< x_1 , y_1 > \bullet < x_2 , y_2 > = x_1x_2 + y_1y_2$$

This product is a ***scalar***, rather than a vector.

If **u • v = 0,** the vectors **u** and **v** are ***orthogonal*** (perpendicular).

Ex1: Find $< 2, 3 > \bullet <-4, 5 >$

Ex2: Find $\mathbf{u} \bullet \mathbf{v}$

Given $\mathbf{u} = i - 2j$ and $\mathbf{v} = 6i + 3j$

2 vectors are parallel if one is the scalar product of the other one.

so….. < 2, 1 > and < 4, 2 >

2< 2, 1 > *factor*

Ex.3: Are the vectors orthogonal, parallel, or neither?

a) < 4, 12 > and < 12, 36 >

b) < 2, -3 > and < 6, 4 >

Ex.4:Find the value of k so that the vectors $5i+kj$ and $2i+3j$

a) Parallel:

b) Orthogonal:

Finding Angles Between 2 Vectors

$$\cos\theta = \frac{\vec{u} \bullet \vec{v}}{|\vec{u}||\vec{v}|} \quad for\ 0° \le \theta \le 180°$$

Ex.5: **u** = < 1, 3 > and **v** = < −2, 4 >, find the measure of the angle between **u** and **v**.

Ex.6: Given A (3, 1), B (6, 2), and C (4, 5) form Δ ABC, find the measure of the interior angles.