

Quiz #02 – MATH 2421
Summer 2006

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Name : _____

Directions: No calculators, books, or notes. Show algebra. Be sure to highlight your final answer!

1. Dot product.

- (a) A force vector $\mathbf{F} = \langle 30, -20 \rangle$ pounds pushes an object from $P(0, 40)$ to $Q(10, 20)$ [measured in feet].

Find the work accomplished by \mathbf{F} .

- (b) $\mathbf{a} \cdot \mathbf{b} = \|\mathbf{a}\| * \|\mathbf{b}\| * \cos(\alpha)$

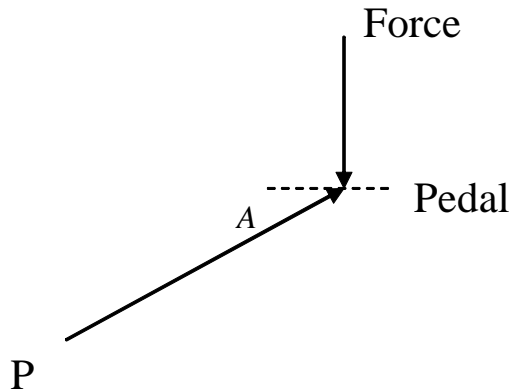
Find the angle of separation between $\mathbf{a} = \langle 1, 2, -2 \rangle$ and $\mathbf{b} = \langle -2, 4, 3 \rangle$.

2. Cross product.

- (a) Torque. The point of rotation is located at P . Angle A measures 30° . The force is applied perpendicular to the pedal, and the pedal is horizontal. The magnitude of the lever arm vector (from P) is one foot. The magnitude of the force is 60 pounds.

$$\|\mathbf{a} \times \mathbf{b}\| = \|\mathbf{a}\| * \|\mathbf{b}\| * \sin(\alpha)$$

Translate tail-to-tail!



- (i) In what direction does the torque vector $(\mathbf{r} \times \mathbf{F})$ point?
- (ii) What is the magnitude of $\mathbf{r} \times \mathbf{F}$?

$$\|\mathbf{r} \times \mathbf{F}\| = \text{_____ ft-lb of torque.}$$

- (b) Evaluate this cross product!

$$\langle -3, 0, 4 \rangle \times \langle 2, -5, 1 \rangle = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ -3 & 0 & 4 \\ 2 & -5 & 1 \end{vmatrix}$$

$$\mathbf{u} \times \mathbf{v} = \langle \quad , \quad , \quad \rangle$$