Quiz I What to Study

January 21, 2016

1 The Dot Product

1.1 Angle Between Two Vector (Dot Product)

The angle between vectors $\vec{u}$ and $\vec{v}$ is

$$\vec{u} \cdot \vec{v} = \mid \vec{u} \mid \mid \vec{v} \mid \cos\theta$$

1.2 Orthogonal Vectors

Two vectors $\vec{u}$ and $\vec{v}$ are orthogonal if

$$\vec{u} \cdot \vec{v} = 0$$

1.3 Properties of the Dot Product

$$\begin{aligned}
\vec{u} \cdot \vec{v} &= \vec{v} \cdot \vec{u} \\
\vec{u} \cdot (\vec{v} + \vec{w}) &= \vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{w} \\
\vec{u} \cdot \vec{0} &= 0 \\
\vec{u} \cdot \vec{u} &= \mid \vec{u} \mid^2 \\
(c\vec{u}) \cdot \vec{v} &= \vec{u} \cdot (c\vec{v}) = c(\vec{u} \cdot \vec{v})
\end{aligned}$$

1.4 Projection of $\vec{u}$ onto $\vec{v}$

$$\text{proj}_{\vec{v}}\vec{u} = \frac{\vec{u} \cdot \vec{v}}{\mid \vec{v} \mid^2}\vec{v}$$

1.5 Work

$$\text{Work} = \vec{F} \cdot \vec{D}$$

2 The Cross Product

2.1 Angle between two Vectors

$$\vec{v} \times \vec{u} = \vec{n} \mid \vec{v} \mid\mid \vec{u} \mid \sin\theta$$

2.2 Area of a Parallelogram

$$\text{Area} = \mid \vec{u} \times \vec{v} \mid$$

2.3 Volume of a Parallelepiped

$$\text{Volume} = \vec{u} \cdot (\vec{v} \times \vec{w})$$

3 Planes and Lines

3.1 Distance from a Point to a Line

Distance from a point S to a line through P parallel to $\vec{v}$

$$d = \frac{\mid \vec{PS} \times \vec{v} \mid}{\mid \vec{v} \mid}$$

3.2 Distance from a Point to a Plane

Distance from a point S to a plane containing point P whose normal vector is $\vec{n}$:

$$d = \mid \vec{PS} \cdot \frac{\vec{n}}{\mid \vec{n} \mid} \mid$$