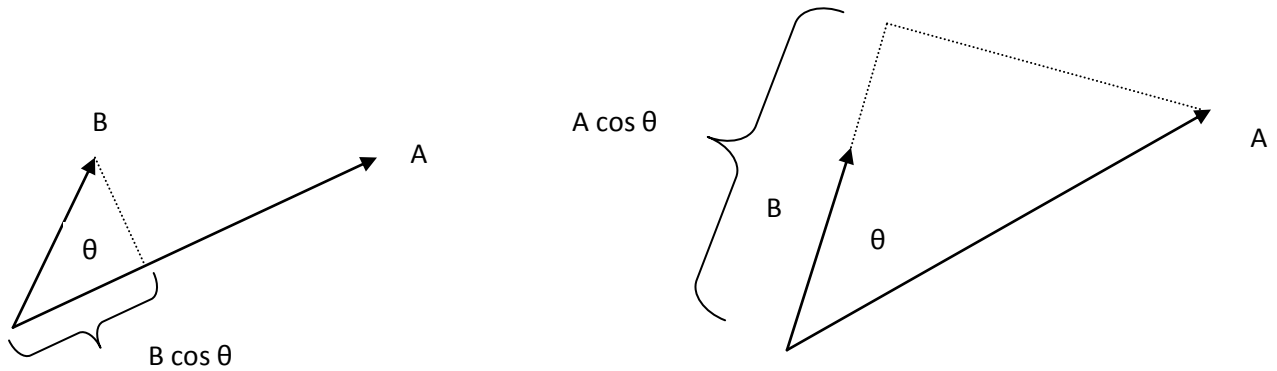


## Dot Product



$$A \cdot B = A(B \cos \theta)$$

$$B \cdot A = B(A \cos \theta)$$

$$A \cdot B = B \cdot A$$

$$A \cdot B = A_x B_x + A_y B_y + A_z B_z$$

$$A \cdot A = A^2$$

$$A \cdot (B + C) = A \cdot B + A \cdot C$$

## Miscellaneous

$$\int \frac{dx}{\sqrt{x^2 + a^2}} = \ln(x + \sqrt{x^2 + a^2})$$

$$\int \frac{x dx}{(x^2 + a^2)^{\frac{3}{2}}} = -\frac{1}{(x^2 + a^2)^{\frac{1}{2}}}$$

$$\int \frac{dx}{(x^2 + a^2)^{\frac{3}{2}}} = \frac{x}{a^2(x^2 + a^2)^{\frac{1}{2}}}$$

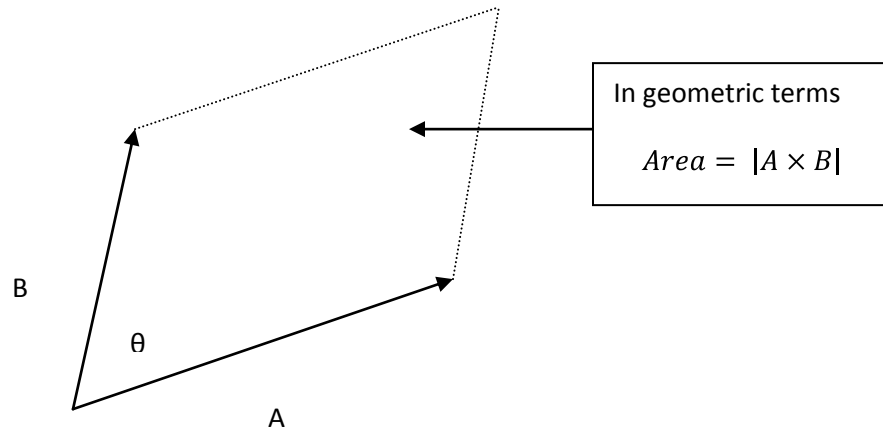
## Binomial Theorem

$$(1 + x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \dots$$

Taylor Series Expansion of  $f(x)$  about point  $a$ .

$$f(x) = f(a) + \frac{f^1(a)}{1!}(x-a)^1 + \frac{f^2(a)}{2!}(x-a)^2 + \frac{f^3(a)}{3!}(x-a)^3 + \dots$$

## Cross Product



$$\vec{A} \times \vec{B} = (AB \sin \theta) \vec{n}$$

$\vec{n}$  is a unit vector with direction defined by the right-hand rule.

As drawn above  $\vec{n}$  is:

Out of the page for  $\vec{A} \times \vec{B}$

into the page for  $\vec{B} \times \vec{A}$

$$\vec{A} \times (\vec{B} + \vec{C}) = (\vec{A} \times \vec{B}) + (\vec{A} \times \vec{C})$$

$$\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$$

$$\vec{A} \times \vec{A} = 0$$

$$\vec{A} \times \vec{B} = (A_y B_z - A_z B_y) \vec{i} + (A_z B_x - A_x B_z) \vec{j} + (A_x B_y - A_y B_x) \vec{k}$$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{vmatrix} = \begin{vmatrix} A_y & A_z \\ B_y & B_z \end{vmatrix} \vec{i} - \begin{vmatrix} A_x & A_z \\ B_x & B_z \end{vmatrix} \vec{j} + \begin{vmatrix} A_x & A_y \\ B_x & B_y \end{vmatrix} \vec{k}$$