$\sin(x)$

$\cos(x)$

e^x

$$\sin(x \pm y) = \sin(x)\cos(y) \pm \sin(y)\cos(x)$$

$$\cos(x \pm y) = \cos(x)\cos(y) \mp \sin(x)\sin(y)$$

$$e^{x+y} = e^x e^y$$

$$e^{ix} = \cos x + i \sin x$$

$$i^2 = -1$$

$$\sin 2x = 2 \sin x \cos x$$

$$\cos 2x = 2\cos^2 x - 1$$
$$= 1 - 2\sin^2 x$$

$$\cos^2 x + \sin^2 x = 1$$

$$\vec{u} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} = a_1 \vec{i} + a_2 \vec{j} + a_3 \vec{k}$$

$$(ab)\vec{u} = a(b\vec{u})$$

$$\begin{pmatrix} a_1 \\ a_2 \end{pmatrix} \pm \begin{pmatrix} b_1 \\ b_2 \end{pmatrix} = \begin{pmatrix} a_1 \pm b_1 \\ a_2 \pm b_2 \end{pmatrix}$$

$$a(\vec{u} + \vec{v}) = a\vec{u} + a\vec{v}$$

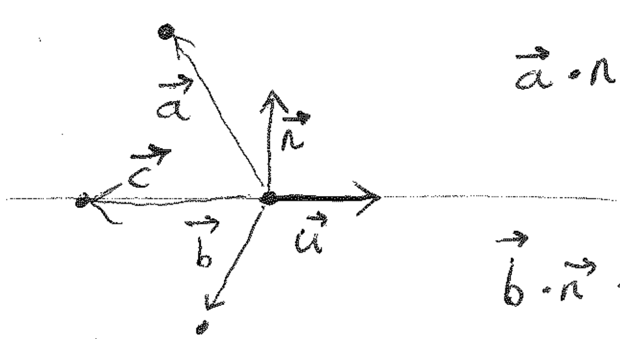
$$c\begin{pmatrix} a_1 \\ a_2 \end{pmatrix} = \begin{pmatrix} c a_1 \\ c a_2 \end{pmatrix}$$

$$\vec{u} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \quad \vec{v} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$$

$$\vec{u} \cdot \vec{v} = a_1 b_1 + a_2 b_2 + a_3 b_3$$

$$\vec{u} \cdot \vec{u} = a_1^2 + a_2^2 + a_3^2 = \|\vec{u}\|^2$$

$\|\vec{u}\|$ = length of $\vec{u}$



$\vec{a} \cdot n > 0$

$\vec{c} \cdot \vec{n} = 0$

$\vec{b} \cdot \vec{n} < 0$

$$\vec{w} = \vec{u} \times \vec{v} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \times \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} = \begin{pmatrix} a_2 b_3 - a_3 b_2 \\ a_3 b_1 - a_1 b_3 \\ a_1 b_2 - a_2 b_1 \end{pmatrix}$$

$$= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix} = (a_2 b_3 - a_3 b_2)\vec{i} + (a_3 b_1 - a_1 b_3)\vec{j} + (a_1 b_2 - a_2 b_1)\vec{k}$$

$\vec{w}$ <u>orthog</u> to $\vec{u}, \vec{v}$

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

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

$\|\vec{w}\| = \|\vec{u}\| \; \|\vec{v}\| \; \sin\theta$

$i \times j = k$