$$(1) sen^2(\alpha)+\cos^2(\alpha)=1$$
$$(2) sen(\alpha+\beta)=sen\alpha\cos\beta+sen\beta\cos\alpha$$
$$(3) sen(\alpha-\beta)=sen\alpha\cos\beta-sen\beta\cos\alpha$$
$$(4)\cos(\alpha+\beta)=\cos\alpha\cos\beta-sen\alpha sen\beta$$
$$(5)\cos(\alpha-\beta)=\cos\alpha\cos\beta+sen\alpha sen\beta$$

en $(2)\alpha=\beta$

$$sen(\alpha+\alpha)=sen\alpha\cos\alpha+sen\alpha\cos\alpha$$
$$(6) sen(2\alpha)=2sen\alpha\cos\alpha$$

en(4) $\alpha=\beta$

$$\cos(\alpha+\alpha)=\cos\alpha\cos\alpha-sen\alpha sen\alpha$$

$$(7)\cos(2\alpha)=\cos^2(\alpha)-sen^2(\alpha)$$
$$(8)\cos(2\alpha)=1-2sen^2(\alpha)$$
$$(9)\cos(2\alpha)=2\cos^2(\alpha)-1$$

desde (8)

$$\cos(2\alpha)=1-2sen^2(\alpha)$$
$$sen^2(\alpha)=\frac{1-\cos(2\alpha)}{2}$$
$$(10)\left|sen(\alpha)\right|=\sqrt{\frac{1-\cos\alpha}{2}}$$

desde (9)

$$(11)\left|\cos(\alpha)\right|=\sqrt{\frac{1+\cos\alpha}{2}}$$

$$(2) sen\left(\alpha+\beta\right)=sen\alpha\cos\beta+sen\beta\cos\alpha$$
$$(3) sen\left(\alpha-\beta\right)=sen\alpha\cos\beta-sen\beta\cos\alpha$$
$$\left(2\right)+\left(3\right)$$

$$sen\left(\alpha+\beta\right)+sen\left(\alpha-\beta\right)=2sen\alpha\cos\beta$$
$$\left.\begin{array}{l} u=\alpha+\beta \\ w=\alpha-\beta \end{array}\right\}$$
$$\frac{u+w}{2}=\alpha$$
$$u-\frac{u+w}{2}=\beta$$
$$\frac{u-w}{2}=\beta$$
$$sen\left(\alpha+\beta\right)+sen\left(\alpha-\beta\right)=2sen\alpha\cos\beta$$

$$(12) sen(u)+sen(w)=2sen\left(\frac{u+w}{2}\right)\cos\left(\frac{u-w}{2}\right)$$

$$(2) sen\left(\alpha+\beta\right)=sen\alpha\cos\beta+sen\beta\cos\alpha$$
$$(3) sen\left(\alpha-\beta\right)=sen\alpha\cos\beta-sen\beta\cos\alpha$$
$$\left(2\right)-\left(3\right)$$
$$sen\left(\alpha+\beta\right)-sen\left(\alpha-\beta\right)=2sen\beta\cos\alpha$$

$$(13) sen(u)-sen(w)=2sen\left(\frac{u-w}{2}\right)\cos\left(\frac{u+w}{2}\right)$$

$$(4)\cos\left(\alpha+\beta\right)=\cos\alpha\cos\beta-sen\alpha sen\beta$$
$$(5)\cos\left(\alpha-\beta\right)=\cos\alpha\cos\beta+sen\alpha sen\beta$$

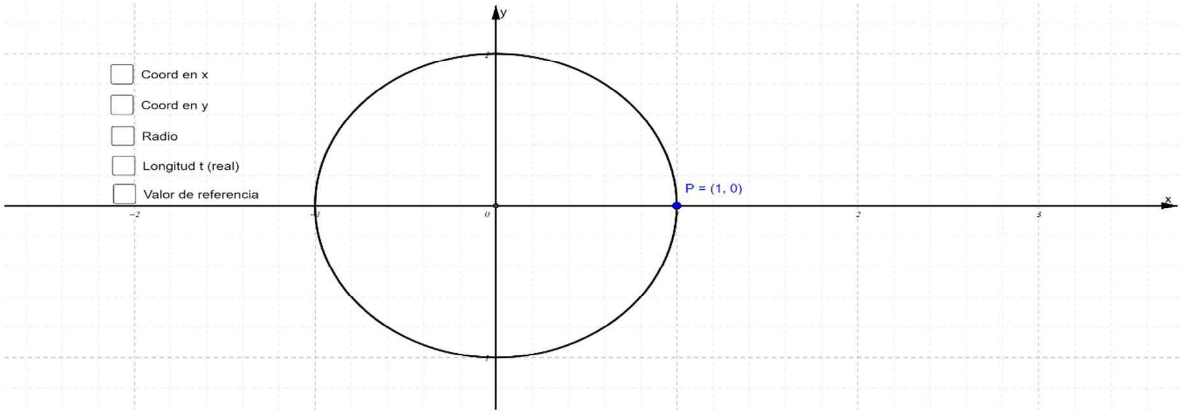
$$\left(4\right)+\left(5\right)\cos\left(\alpha+\beta\right)+\cos\left(\alpha-\beta\right)=2\cos\alpha\cos\beta$$
$$(14)\cos(u)+\cos(w)=2\cos\left(\frac{u+w}{2}\right)\cos\left(\frac{u-w}{2}\right)$$

$$(4)\cos(\alpha+\beta)=\cos\alpha\cos\beta-sen\alpha sen\beta$$
$$(5)\cos(\alpha-\beta)=\cos\alpha\cos\beta+sen\alpha sen\beta$$
$$(4)-(5)$$
$$\cos(\alpha+\beta)-\cos(\alpha-\beta)=-2sen\alpha sen\beta$$

$$(15)\cos(u)-\cos(w)=-2sen\left(\frac{u+w}{2}\right)sen\left(\frac{u-w}{2}\right)$$

Valores fundamentales

	0°	30°	45°	60°	90°	180°	270°	360°	
sen	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0	
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1	
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	∞	0	$-\infty$	0	



Ecuaciones elementales

$$senx = 0$$
$$x = k\pi; k \in \mathbb{Z}$$

$$senx = 1$$
$$x = \frac{\pi}{2} + k \cdot 2\pi; k \in \mathbb{Z}$$

$$senx = -1$$
$$x = \frac{3\pi}{2} + k \cdot 2\pi$$

$$\cos(\alpha) = 0$$
$$\alpha = \frac{\pi}{2} + k \cdot \pi$$

$$\cos\alpha = 1$$
$$\alpha = 0 + k \cdot 2\pi$$

$$\cos\alpha = -1$$
$$\alpha = \pi + k \cdot 2\pi$$

Resolver:

$$Sen\left(2x + \frac{\pi}{3}\right) = 0$$

$$Sen\left(2x + \frac{\pi}{3}\right) = 0$$

$$2x + \frac{\pi}{3} = k\pi; \quad \mathrm{k} \in Z$$

$$2x = k\pi - \frac{\pi}{3}$$

$$x = \frac{k\pi}{2} - \frac{\pi}{6}$$

II Sen+ Cos-- Tan--	I Sen+ Cos+ Tan+
III Sen— Cos— Tan+	IV Sen— Cos+ Tan--

II $180° - S_I$ $(\pi - S_I)$	I S_I
III $180° + S_I$ $(\pi + S_I)$	IV $360° - S_I$ $(2\pi - S_I)$

$$senx = \frac{1}{2}$$

$$x \in \begin{cases} I \\ II \end{cases}$$

$$S_I = sen^{-1}\left(\frac{1}{2}\right) = 30° = \frac{\pi}{6}$$

$$x = \begin{cases} \frac{\pi}{6} + k \cdot 2\pi \\ \pi - \frac{\pi}{6} + k \cdot 2\pi \end{cases}$$

$$x = \begin{cases} \frac{\pi}{6} + k \cdot 2\pi \\ \frac{5\pi}{6} + k \cdot 2\pi \end{cases}$$

$$k = 0$$

$$x = \frac{\pi}{6}, x = \frac{5\pi}{6}$$

$$k = 1$$

$$x = \frac{\pi}{6} + 2\pi = \frac{13\pi}{6}; x = \frac{5\pi}{6} + 2\pi = \frac{17\pi}{6}$$

etc

$$sen2x = \frac{-\sqrt{2}}{2}$$

$$2x \in \begin{cases} III \\ IV \end{cases}$$

$$S_I = sen^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45° = \frac{\pi}{4}$$

$$2x = \begin{cases} \pi + \frac{\pi}{4} + k \cdot 2\pi \\ 2\pi - \frac{\pi}{4} + k \cdot 2\pi \end{cases}$$

$$2x = \begin{cases} \frac{5\pi}{4} + k \cdot 2\pi \\ \frac{7\pi}{4} + k \cdot 2\pi \end{cases}$$

$$x = \begin{cases} \frac{5\pi}{8} + k \cdot \pi \\ \frac{7\pi}{8} + k \cdot \pi \end{cases}$$

Resuelva:

$$2\cos^2 x + \cos x - 1 = 0$$

$$u = \cos x$$

$$2u^2 + u - 1 = 0$$

$$u = \frac{-1 \pm \sqrt{1+8}}{4} = \frac{-1 \pm 3}{4} =$$

$$u_1 = -1$$

$$u_2 = \frac{1}{2}$$

$$\cos x = -1 \vee \cos x = \frac{1}{2}$$