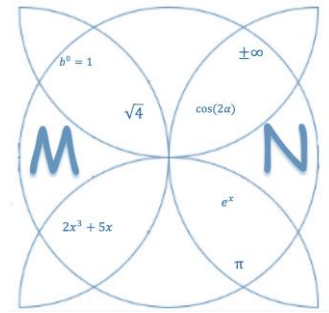
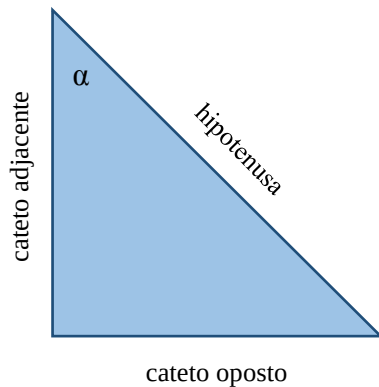




1. Generalidades



$$\sin \alpha = \frac{\text{cateto oposto}}{\text{hipotenusa}}$$

$$\cos \alpha = \frac{\text{cateto adjacente}}{\text{hipotenusa}}$$

$$\tan \alpha = \frac{\text{cateto oposto}}{\text{cateto adjacente}}$$

Fórmula fundamental da Trigonometria

$$(\sin \alpha)^2 + (\cos \alpha)^2 = 1$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

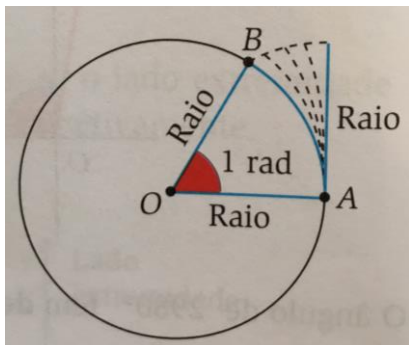
$$1 + \frac{1}{(\tan \alpha)^2} = \frac{1}{(\sin \alpha)^2}$$

$$1 + (\tan \alpha)^2 = \frac{1}{(\cos \alpha)^2}$$

	30°	45°	60°
$\sin \alpha$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
$\cos \alpha$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
$\tan \alpha$	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

	0°	90°	180°	270°
$\sin \alpha$	0	1	0	-1
$\cos \alpha$	1	0	-1	0
$\tan \alpha$	0	n.d.	0	n.d.

A quantos graus equivale um radiano?

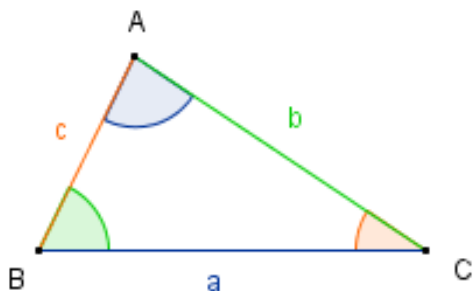


$$1 \text{ radiano} = \frac{360}{2\pi} \text{ graus}$$

$$1 \text{ radiano} = \frac{180}{\pi} \text{ graus}$$

Graus	0º	90º	180º	270º	360º
Radianos	0 rad	$\frac{\pi}{2} \text{ rad}$	$\pi \text{ rad}$	$\frac{3\pi}{2} \text{ rad}$	$2\pi \text{ rad}$

2. Lei dos Senos. Lei dos Cossenos.



Lei dos Senos

$$\frac{\sin \hat{A}}{a} = \frac{\sin \hat{B}}{b} = \frac{\sin \hat{C}}{c}$$

Lei dos Cossenos

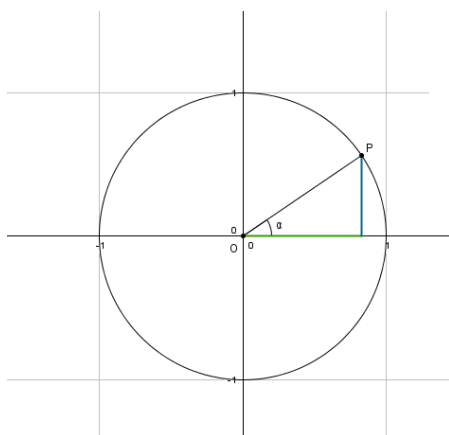
$$a^2 = b^2 + c^2 - 2 \times b \times c \times \cos \hat{A}$$

$$b^2 = a^2 + c^2 - 2 \times a \times c \times \cos \hat{B}$$

$$c^2 = a^2 + b^2 - 2 \times a \times b \times \cos \hat{C}$$

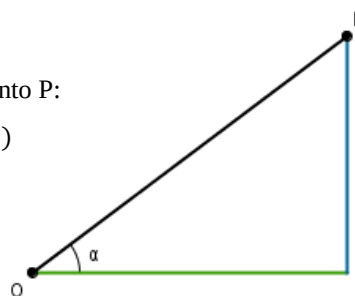
3. Ângulos generalizados

Círculo trigonométrico:

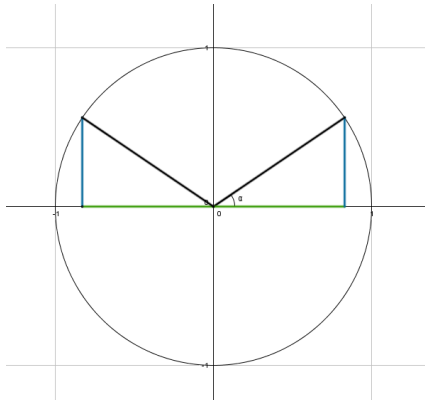


Coordenadas do ponto P:

$$P(\cos \alpha, \sin \alpha)$$



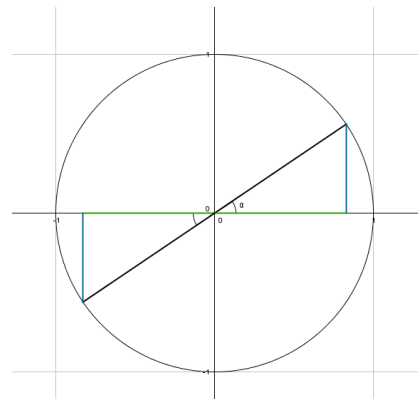
Relações entre as razões trigonométricas de α , $-\alpha$, $\pi-\alpha$ e $\pi+\alpha$



$$\sin(180^\circ - \alpha) = \sin \alpha$$

$$\cos(180^\circ - \alpha) = -\cos \alpha$$

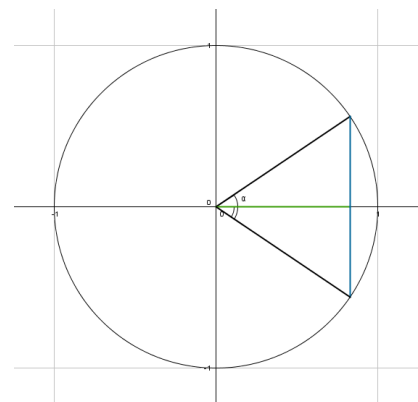
$$\tan(180^\circ - \alpha) = -\tan \alpha$$



$$\sin(180^\circ + \alpha) = -\sin \alpha$$

$$\cos(180^\circ + \alpha) = -\cos \alpha$$

$$\tan(180^\circ + \alpha) = \tan \alpha$$



$$\sin(-\alpha) = -\sin \alpha$$

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

$$\tan(-\alpha) = -\tan \alpha$$

$$\sin(90^\circ - \alpha) = \cos \alpha$$

$$\cos(90^\circ - \alpha) = \sin \alpha$$

$$\tan(90^\circ - \alpha) = \frac{1}{\tan \alpha}$$

$$\sin(90^\circ + \alpha) = \cos \alpha$$

$$\cos(90^\circ + \alpha) = -\sin \alpha$$

$$\tan(90^\circ + \alpha) = -\frac{1}{\tan \alpha}$$

$$\sin(270^\circ - \alpha) = -\cos \alpha$$

$$\cos(270^\circ - \alpha) = -\sin \alpha$$

$$\tan(270^\circ - \alpha) = \frac{1}{\tan \alpha}$$

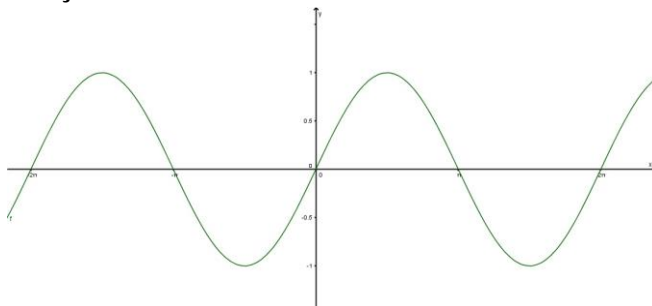
$$\sin(270^\circ + \alpha) = -\cos \alpha$$

$$\cos(270^\circ + \alpha) = \sin \alpha$$

$$\tan(270^\circ + \alpha) = -\frac{1}{\tan \alpha}$$

4. Funções trigonométricas

Função seno



$$D = \mathbb{R}$$

$$D' = [-1, 1]$$

Período: 2π

Função ímpar

$$\rightarrow \sin(-x) = -\sin(x)$$

$\rightarrow$ Simetria em relação à origem

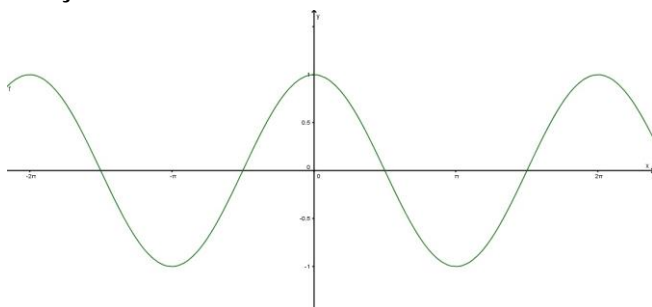
Zeros: $x = k\pi, k \in \mathbb{Z}$

Extremos

$$\rightarrow \text{Máximo: } 1; \text{ Maximizantes: } x = \frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}$$

$$\rightarrow \text{Mínimo: } -1; \text{ Minimizantes: } x = \frac{3\pi}{2} + 2k\pi, k \in \mathbb{Z}$$

Função cosseno



$$D = \mathbb{R}$$

$$D' = [-1, 1]$$

Período: 2π

Função par

$$\rightarrow \cos(x) = \cos(-x)$$

$\rightarrow$ Simetria em relação ao eixo das ordenadas

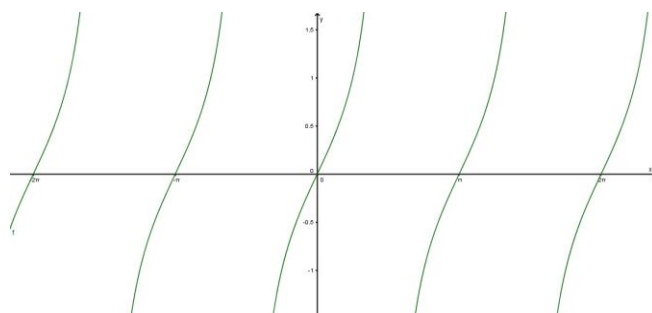
Zeros: $x = k\pi, k \in \mathbb{Z}$

Extremos

$$\rightarrow \text{Máximo: } 1; \text{ Maximizantes: } x = 2k\pi, k \in \mathbb{Z}$$

$$\rightarrow \text{Mínimo: } -1; \text{ Minimizantes: } x = \pi + 2k\pi, k \in \mathbb{Z}$$

Função tangente



$$D = \mathbb{R} \setminus \left\{ \frac{\pi}{2} + k\pi, k \in \mathbb{Z} \right\}$$

$$D' = \mathbb{R}$$

Período: π

Função ímpar

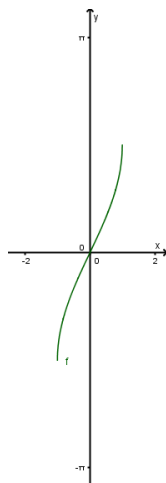
$$\rightarrow \tan(-x) = -\tan(x)$$

$\rightarrow$ Simetria em relação à origem

Zeros: $x = k\pi, k \in \mathbb{Z}$

5. Funções trigonométricas inversas

Função arco seno

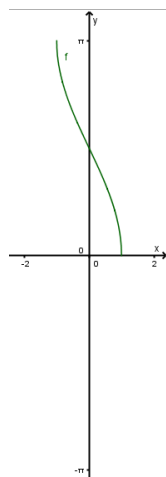


$$y = \arcsin(x) \Leftrightarrow x = \sin(y), \text{ para } -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

$$D = [-1, 1]$$

$$D' = \left[-\frac{\pi}{2}; \frac{\pi}{2}\right]$$

Função arco cosseno



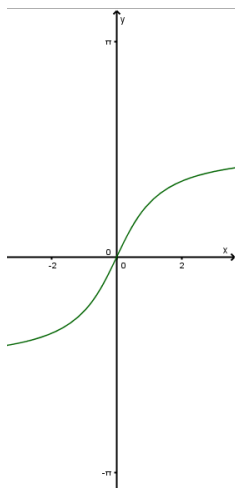
$$y = \arccos(x) \Leftrightarrow x = \cos(y), \text{ para } 0 \leq y \leq \pi$$

$$\text{Note-se que } \arccos(x) = \frac{\pi}{2} - \arcsin(x)$$

$$D = [-1, 1]$$

$$D' = [0; \pi]$$

Função arco tangente



$$y = \arctan(x) \Leftrightarrow x = \tan(y), \text{ para } -\frac{\pi}{2} < y < \frac{\pi}{2}$$

$$D = \mathbb{R}$$

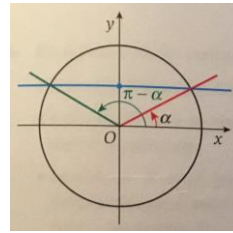
$$D' = \left(-\frac{\pi}{2}; \frac{\pi}{2}\right)$$

6. Equações trigonométricas

Equações do tipo $\sin x = a$

$$\sin x = \sin a$$

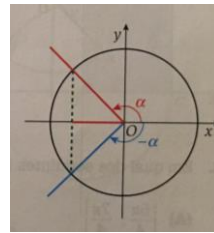
$$\Leftrightarrow x = a + 2k\pi \vee x = \pi - a + 2k\pi, k \in \mathbb{Z}$$



Equações do tipo $\cos x = a$

$$\cos x = \cos a$$

$$\Leftrightarrow x = a + 2k\pi \vee x = -a + 2k\pi, k \in \mathbb{Z}$$



Equações do tipo $\tan x = a$

$$\tan x = \tan a$$

$$\Leftrightarrow x = a + k\pi, k \in \mathbb{Z}$$

