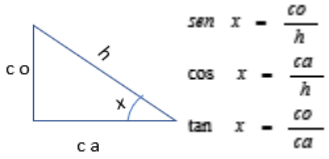
TRIGONOMETRIA

Razões trigonométricas

SOHCAHTOA

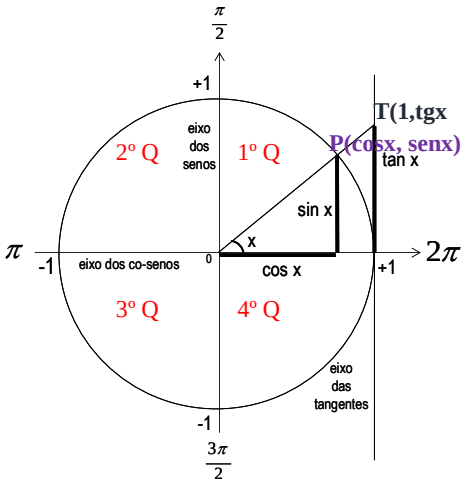


Teorema de Pitágoras

$$h^2 = co^2 + ca^2$$

$$1^0 = 60' \qquad 1' = 60''$$
$$180^0 = \pi\ rad$$

Círculo trigonométrico



Fórmula fundamental da trigonometria:

$$sen^2\alpha + \cos^2\alpha = 1$$

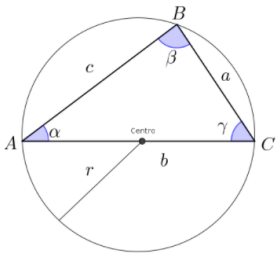
Outras fórmulas:

$$tg\ \alpha = \frac{sen\alpha}{\cos\alpha}$$

$$1 + \frac{1}{tg^2\alpha} = \frac{1}{sen^2\alpha}$$

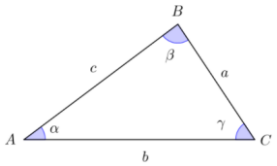
$$tg^2\alpha + 1 = \frac{1}{\cos^2\alpha}$$

Lei dos senos



$$\frac{a}{sen\alpha} = \frac{b}{cos\beta} = \frac{c}{cos\gamma} = 2r$$

Lei dos cossenos



$$a^2 = b^2 + c^2 - 2.b.c.cos\alpha$$

$$b^2 = a^2 + c^2 - 2.a.c.cos\alpha$$

$$c^2 = a^2 + b^2 - 2.a.b.cos\alpha$$

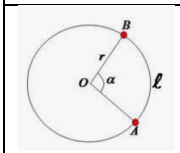
Tabela

Ângulo	0º ou 0 rad	30º ou $\frac{\pi}{6}$ rad	45º ou $\frac{\pi}{4}$ rad	60º ou $\frac{\pi}{3}$ rad	90º ou $\frac{\pi}{2}$ rad	180º ou π rad	270º ou $\frac{3\pi}{2}$ rad
sen α	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
cos α	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
tg α	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	--	0	--

Reduções ao 1º quadrante:

$sen(-\alpha) = -sen\alpha$ $\cos(-\alpha) = \cos\alpha$ $tg(-\alpha) = -tg\,\alpha$	$sen(\pi - \alpha) = sen\alpha$ $\cos(\pi - \alpha) = -\cos\alpha$ $tg(\pi - \alpha) = -tg\,\alpha$	$sen(\pi + \alpha) = -sen\alpha$ $\cos(\pi + \alpha) = -\cos\alpha$ $tg(\pi + \alpha) = tg\,\alpha$	$sen(2\pi - \alpha) = -sen\alpha$ $\cos(2\pi - \alpha) = \cos\alpha$ $tg(2\pi - \alpha) = -tg\,\alpha$
$sen(\frac{\pi}{2} - \alpha) = \cos\alpha$ $\cos(\frac{\pi}{2} - \alpha) = sen\alpha$	$sen(\frac{\pi}{2} + \alpha) = \cos\alpha$ $\cos(\frac{\pi}{2} + \alpha) = -sen\alpha$	$sen(\frac{3\pi}{2} - \alpha) = -\cos\alpha$ $\cos(\frac{3\pi}{2} - \alpha) = -sen\alpha$	$sen(\frac{3\pi}{2} + \alpha) = -\cos\alpha$ $\cos(\frac{3\pi}{2} + \alpha) = sen\alpha$

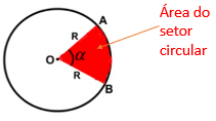
Perímetro do setor circular



Graus Radianos

$$\frac{360^0}{\alpha} = \frac{2\pi r}{l} \quad ou \quad \frac{2\pi}{\alpha} = \frac{2\pi r}{x}$$

Área do setor circular



Graus Radianos

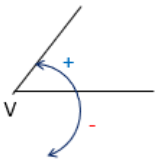
$$\frac{360^0}{\alpha} = \frac{\pi r^2}{x} \quad ou \quad \frac{2\pi}{\alpha} = \frac{\pi r^2}{x}$$

Equações trigonométricas:

$$sen\,x = sen\,\alpha \Leftrightarrow x = \alpha + 2k\pi \vee x = \pi - \alpha + 2k\pi, k \in Z$$

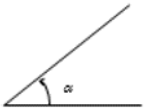
$$\cos x = \cos\alpha \Leftrightarrow x = \alpha + 2k\pi \vee x = -\alpha + 2k\pi, k \in Z$$

$$\tan x = \tan\alpha \Leftrightarrow x = \alpha + k\pi, k \in Z$$



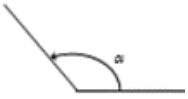
Classificação de ângulos

Ângulo nulo
$\alpha=0^0$

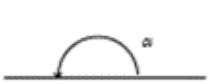


Ângulo agudo
$0^0<\alpha<90^0$

Ângulo reto
$\alpha=90^0$

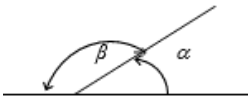


Ângulo obtuso
$90^0<\alpha<180^0$

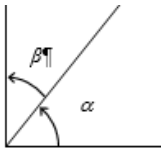


Ângulo raso
$\alpha=180^0$

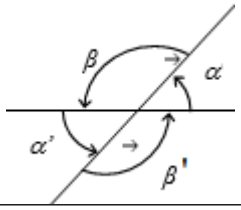
Ângulo giro
$\alpha=360^0$



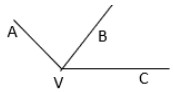
Ângulos suplementares
$\alpha+\beta=180^0$



Ângulos complementares
$\alpha+\beta=90^0$



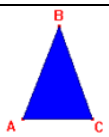
Ângulos verticalmente opostos
$\alpha+\beta+\alpha'+\beta'=360^0$



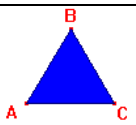
Ângulos adjacentes têm o mesmo vértice e um lado em comum

Classificação de triângulos

Quanto aos lados



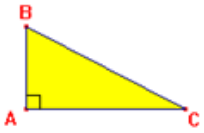
Isósceles (2 lados iguais)



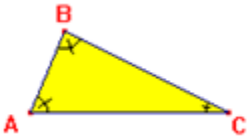
Equilátero (os 3 lados iguais)

Escaleno (os lados todos diferentes)

Quanto aos ângulos

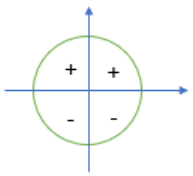
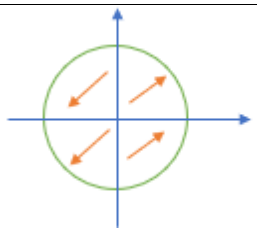
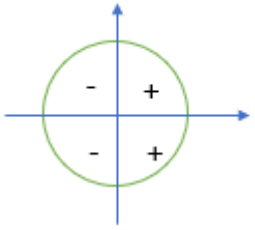
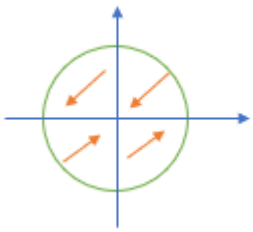
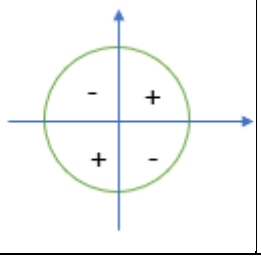
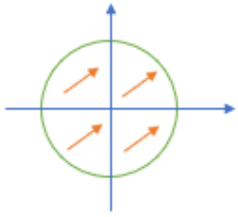


Retângulo (tem um ângulo reto.)



Acutângulo (todos os ângulos agudos)

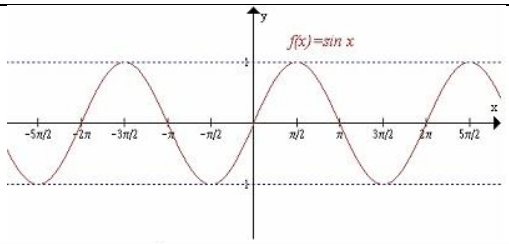
Obtusângulo (tem um ângulo obtuso)

Função	*Par ou Ímpar*	*Período*	*Sinal*	*Domínio*	*Contradomínio*	*Monotonia*
senx	***Ímpar*** sen(-x)=senx	***2π***		***R***	***[-1,1]***	
cosx	***Par*** cos(-x)=cosx	***2π***		***R***	***[-1,1]***	
tg(x)	***Ímpar*** tg(-x))-tgx	***π***		$x\neq\frac{\pi}{2}+k\pi$	***R***	

Uma função **f** real de variável real diz-se **periódica** se e só se existe um número real positivo **k** tal que
f (x+k) = f (x), ∀ x ∈ D_f

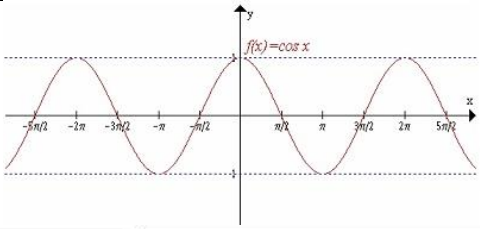
Uma função f diz-se **Par** sse **f(-x)=f(x) , ∀ x ∈ D_f** Uma função diz-se **Ímpar** sse **f(-x)=-f(x) , ∀ x ∈ D_f**

Função Seno



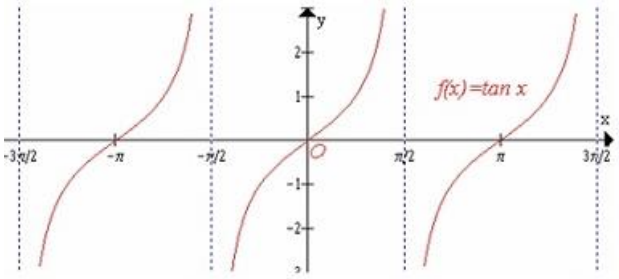
	$f(x)=\sin x$
Domínio	$\mathbb{R}$
Contradomínio	$]-1,1[$
Continuidade	É contínua em $\mathbb{R}$
Zeros	$x=k\pi\ ,k\in\mathbb{Z}$
Periodicidade	Período 2π
Injectividade	Não injectiva
Paridade	É ímpar $\sin(-x)=-\sin x$
Derivada	$f'(x)=\cos x$
Mínimos	$y=-1$ para $x=\frac{3\pi}{2}+2k\pi\ ,k\in\mathbb{Z}$
Máximos	$y=1$ para $x=\frac{\pi}{2}+2k\pi\ ,k\in\mathbb{Z}$
Assimptotas	Não tem

Função Cosseno



	$f(x)=\cos x$
Domínio	$\mathbb{R}$
Contradomínio	$]-1,1[$
Continuidade	É contínua em $\mathbb{R}$
Zeros	$x=\frac{\pi}{2}+k\pi\ ,k\in\mathbb{Z}$
Periodicidade	Período 2π
Injectividade	Não injectiva
Paridade	É par $\cos(-x)=\cos x$
Derivada	$f'(x)=-\sin x$
Mínimos	$y=-1$ para $x=2(k+1)\pi\ ,k\in\mathbb{Z}$
Máximos	$y=1$ para $x=2k\pi\ ,k\in\mathbb{Z}$
Assimptotas	Não tem

Função tangente



	$f(x)=\tan x$
Domínio	$\left\{x\in\mathbb{R}: x\neq\frac{\pi}{2}+k\pi, k\in\mathbb{Z}\right\}$
Contradomínio	$\mathbb{R}$
Continuidade	É contínua no seu domínio
Zeros	$x=k\pi, k\in\mathbb{Z}$
Periodicidade	Período π
Injectividade	Não injectiva
Paridade	É ímpar $\tan(-x)=-\tan x$
Derivada	$f'(x)=\frac{1}{\cos^2 x}$
Extremos	Não tem
Assimptotas	Rectas de equação $x=\frac{\pi}{2}+k\pi, k\in\mathbb{Z}$