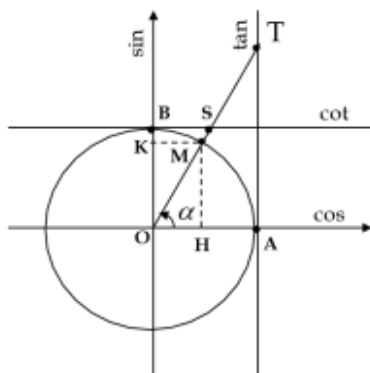


LƯỢNG GIÁC



- $\cos \alpha = x = \overline{OH}$
- $\sin \alpha = y = \overline{OK}$
- $\tan \alpha = \frac{\sin \alpha}{\cos \alpha} = \overline{AT} \left(\alpha \neq \frac{\pi}{2} + k\pi \right)$
- $\cot \alpha = \frac{\cos \alpha}{\sin \alpha} = \overline{BS} \left(\alpha \neq k\pi \right)$

$\forall \alpha$, ta có:

- $-1 \leq \cos \alpha \leq 1$
- $-1 \leq \sin \alpha \leq 1$
- $\sin(\alpha + k2\pi) = \sin \alpha$
- $\cos(\alpha + k2\pi) = \cos \alpha$
- $\tan(\alpha + k\pi) = \tan \alpha$
- $\cot(\alpha + k\pi) = \cot \alpha$

Dấu của các giá trị lượng giác

	I	II	III	IV
$\sin \alpha$	+	+	-	-
$\cos \alpha$	+	-	-	+
$\tan \alpha$	+	-	+	-
$\cot \alpha$	+	-	+	-

Giá trị lượng giác của các góc đặc biệt

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π
	0°	30°	45°	60°	90°	180°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$		0
cot		$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	

CÔNG THỨC LƯỢNG GIÁC

Hai góc đối nhau	Hai góc bù nhau	Hai góc hơn kém π
$\sin(-\alpha) = -\sin \alpha$ $\cos(-\alpha) = \cos \alpha$ $\tan(-\alpha) = -\tan \alpha$ $\cot(-\alpha) = -\cot \alpha$	$\sin(\pi - \alpha) = \sin \alpha$ $\cos(\pi - \alpha) = -\cos \alpha$ $\tan(\pi - \alpha) = -\tan \alpha$ $\cot(\pi - \alpha) = -\cot \alpha$	$\sin(\alpha + \pi) = -\sin \alpha$ $\cos(\alpha + \pi) = -\cos \alpha$ $\tan(\alpha + \pi) = \tan \alpha$ $\cot(\alpha + \pi) = \cot \alpha$
Hai góc phụ nhau	Hai góc hơn kém $\frac{\pi}{2}$	Công thức lượng giác cơ bản
$\sin\left(\frac{\pi}{2} - \alpha\right) = \cos \alpha$ $\cos\left(\frac{\pi}{2} - \alpha\right) = \sin \alpha$ $\tan\left(\frac{\pi}{2} - \alpha\right) = \cot \alpha$ $\cot\left(\frac{\pi}{2} - \alpha\right) = \tan \alpha$	$\sin\left(\alpha + \frac{\pi}{2}\right) = \cos \alpha$ $\cos\left(\alpha + \frac{\pi}{2}\right) = -\sin \alpha$ $\tan\left(\alpha + \frac{\pi}{2}\right) = -\cot \alpha$ $\cot\left(\alpha + \frac{\pi}{2}\right) = -\tan \alpha$	$\sin^2 \alpha + \cos^2 \alpha = 1$ $\tan \alpha \cdot \cot \alpha = 1$ $\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$ $\cot \alpha = \frac{\cos \alpha}{\sin \alpha}$ $\frac{1}{\cos^2 \alpha} = 1 + \tan^2 \alpha$ $\frac{1}{\sin^2 \alpha} = 1 + \cot^2 \alpha$

Công thức cộng	Công thức nhân đôi
$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$ $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$ $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$ $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$ $\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$ $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$	$\sin 2\alpha = 2 \sin \alpha \cos \alpha$ $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$ $\cos 2\alpha = 1 - 2 \sin^2 \alpha$ $\cos 2\alpha = 2 \cos^2 \alpha - 1$ $\tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha}$ $\cot 2\alpha = \frac{\cot^2 \alpha - 1}{2 \cot \alpha}$
Công thức hạ bậc	Công thức nhân ba
$\cos^2 \alpha = \frac{1 + \cos 2\alpha}{2}$ $\sin^2 \alpha = \frac{1 - \cos 2\alpha}{2}$ $\tan^2 \alpha = \frac{1 - \cos 2\alpha}{1 + \cos 2\alpha}$	$\cos 3\alpha = 4 \cos^3 \alpha - 3 \cos \alpha$ $\sin 3\alpha = 3 \sin \alpha - 4 \sin^3 \alpha$ $\tan 3\alpha = \frac{3 \tan \alpha - \tan^3 \alpha}{1 - 3 \tan^2 \alpha}$
Công thức biến đổi tích thành tổng	Công thức biến đổi tổng thành tích
$\cos \alpha \cos \beta = \frac{1}{2} [\cos(\alpha + \beta) + \cos(\alpha - \beta)]$ $\sin \alpha \sin \beta = -\frac{1}{2} [\cos(\alpha + \beta) - \cos(\alpha - \beta)]$ $\sin \alpha \cos \beta = \frac{1}{2} [\sin(\alpha + \beta) + \sin(\alpha - \beta)]$	$\cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$ $\cos \alpha - \cos \beta = -2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$ $\sin \alpha + \sin \beta = 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$ $\sin \alpha - \sin \beta = 2 \cos \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$

Công thức tính theo $\tan \frac{x}{2}$	Một số công thức khác
Đặt $t = \tan \frac{x}{2}$. Khi đó: $\cos x = \frac{1-t^2}{1+t^2} \quad \sin x = \frac{2t}{1+t^2}$ $\tan x = \frac{2t}{1-t^2} \quad \cot x = \frac{1-t^2}{2t}$	$\tan \alpha + \tan \beta = \frac{\sin(\alpha + \beta)}{\cos \alpha \cdot \cos \beta}$ $\tan \alpha - \tan \beta = \frac{\sin(\alpha - \beta)}{\cos \alpha \cdot \cos \beta}$ $\cot \alpha + \cot \beta = \frac{\sin(\alpha + \beta)}{\sin \alpha \cdot \sin \beta}$ $\cot \alpha - \cot \beta = \frac{\sin(\beta - \alpha)}{\sin \alpha \cdot \sin \beta}$ $\tan\left(\frac{\pi}{4} + \alpha\right) = \frac{1 + \tan \alpha}{1 - \tan \alpha}$ $\tan\left(\frac{\pi}{4} - \alpha\right) = \frac{1 - \tan \alpha}{1 + \tan \alpha}$

$\sin \alpha + \cos \alpha = \sqrt{2} \cdot \sin\left(\alpha + \frac{\pi}{4}\right) = \sqrt{2} \cdot \cos\left(\alpha - \frac{\pi}{4}\right)$ $\sin \alpha - \cos \alpha = \sqrt{2} \sin\left(\alpha - \frac{\pi}{4}\right) = -\sqrt{2} \cos\left(\alpha + \frac{\pi}{4}\right)$
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