CHEATSHEET DE IDENTIDADES TRIGONOMÉTRICAS

Identidades de Cociente

$$\tan u = \frac{\sin u}{\cos u} \qquad \cot u = \frac{\cos u}{\sin u}$$

Identidades de Recíprocas

$$\csc u = \frac{1}{\sin u} \qquad \sin u = \frac{1}{\csc u}$$
$$\sec u = \frac{1}{\cos u} \qquad \cos u = \frac{1}{\sec u}$$
$$\cot u = \frac{1}{\tan u} \qquad \tan u = \frac{1}{\cot u}$$

Identidades Pitagóricas

$$\boldsymbol{\sin^2 u + \cos^2 u = 1}$$
$$\sin^2 u = 1 - \cos^2 u$$
$$\cos^2 u = 1 - \sin^2 u$$
$$\boldsymbol{\sec^2 u - tan^2 u = 1}$$
$$\sec^2 u = 1 + tan^2 u$$
$$tan^2 u = \sec^2 u - 1$$
$$\boldsymbol{\csc^2 u - cot^2 u = 1}$$
$$\csc^2 u = 1 + cot^2 u$$
$$cot^2 u = \csc^2 u - 1$$

Identidades Pitagóricas Opuestas

$$\cos^2 u - 1 = -\sin^2 u$$
$$\sin^2 u - 1 = -\cos^2 u$$
$$1 - \sec^2 u - = - tan^2 u$$
$$-1 - cot^2 u - = - csc^2 u$$
$$-1 - tan^2 u - = - sec^2 u$$
$$1 - csc^2 u = - cot^2 u$$

Identidades Periódicas

$$\sin(u + 2\pi n) = \sin u$$
$$\cos(u + 2\pi n) = \cos u$$
$$\tan(u + \pi n) = \tan u$$
$$\csc(u + 2\pi n) = \csc u$$
$$\sec(u + 2\pi n) = \sec u$$
$$\cot(u + \pi n) = \cot u$$

Identidades Impares

$$\sin(-u) = -\sin u$$
$$\csc(-u) = -\csc u$$
$$\tan(-u) = -\tan u$$
$$\cot(-u) = -\cot u$$

Identidades Pares

$$\cos(-u) = \cos u$$
$$\sec(-u) = \sec u$$

Identidades de Sin & Cos

$$\sin u + \cos u = \sqrt{2}\sin\left(u + \frac{\pi}{4}\right)$$
$$\sin u + \cos u = \sqrt{2}\cos\left(\frac{\pi}{4} - u\right)$$
$$\sin u - \cos u = \sqrt{2}\sin\left(u - \frac{\pi}{4}\right)$$
$$\sin u - \cos u = \sqrt{2}\cos\left(u + \frac{5\pi}{4}\right)$$
$$\cos u - \sin u = \sqrt{2}\sin\left(\frac{\pi}{4} - u\right)$$
$$\cos u - \sin u = \sqrt{2}\cos\left(u + \frac{\pi}{4}\right)$$

Potenciación de Exponentes

$$\sin^n u = (\sin u)^n$$
$$\cos^n u = (\cos u)^n$$
$$\tan^n u = (\tan u)^n$$
$$\csc^n u = (\csc u)^n$$
$$sec^n u = (\sec u)^n$$
$$cot^n u = (\cot u)^n$$

Multiplicación de Exponentes

$$(\sin^m u)(\sin^n u) = \sin^{m+n} u$$
$$(\cos^m u)(\cos^n u) = \cos^{m+n} u$$
$$(\tan^m u)(\tan^n u) = \tan^{m+n} u$$
$$(\csc^m u)(\csc^n u) = \csc^{m+n} u$$
$$(\sec^m u)(\sec^n u) = \sec^{m+n} u$$
$$(\cot^m u)(\cot^n u) = \cot^{m+n} u$$

Identidades de Doble Ángulo

$$\sin(2u) = 2\sin u \cos u$$
$$\sin u \cos u = \frac{\sin(2u)}{2}$$
$$\cos(2u) = \cos^2 u - \sin^2 u$$
$$\cos(2u) = 2\cos^2 u - 1$$
$$\cos(2u) = 1 - 2\sin^2 u$$
$$\tan(2u) = \frac{2\tan u}{1 - \tan^2 u}$$

Identidades de Medio Ángulo

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1 - \cos u}{2}}$$
$$\cos\frac{u}{2} = \pm\sqrt{\frac{1 + \cos u}{2}}$$
$$\tan\frac{u}{2} = \pm\sqrt{\frac{1 - \cos u}{1 + \cos u}}$$

Identidades Potencia Cuadradas

$$\sin^2 u = \frac{1 - \cos(2u)}{2}$$
$$\cos^2 u = \frac{1 + \cos(2u)}{2}$$
$$\tan^2 u = \frac{1 - \cos(2u)}{1 + \cos(2u)}$$

Identidad de Potencias Cúbicas

$$\sin^3 u = \frac{3\sin u - \sin 3u}{4}$$
$$\cos^3 u = \frac{3\cos u + \cos 3u}{4}$$
$$\tan^3 u = \frac{3\sin u - \sin 3u}{3\cos u + \cos 3u}$$

Identidad de Potencias Cúarticas

$$\sin^4 u = \frac{3 - 4\cos 2u + \cos 4u}{8}$$
$$\cos^4 u = \frac{3 + 4\cos 2u + \cos 4u}{8}$$
$$\tan^4 u = \frac{3 - 4\cos 2u + \cos 4u}{3 + 4\cos 2u + \cos 4u}$$

División de Exponentes

$$\frac{\sin^m u}{\sin^n u} = \sin^{m-n} u$$
$$\frac{\cos^m u}{\cos^n u} = \cos^{m-n} u$$
$$\frac{\tan^m u}{\tan^n u} = \tan^{m-n} u$$
$$\frac{\csc^m u}{\csc^n u} = \csc^{m-n} u$$
$$\frac{\sec^m u}{\sec^n u} = \sec^{m-n} u$$
$$\frac{\cot^m u}{\cot^n u} = \cot^{m-n} u$$

Identidades de Cofunciones

$$\cos\left(\frac{\pi}{2} - u\right) = \sin u$$
$$\sin\left(\frac{\pi}{2} - u\right) = \cos u$$
$$\cot\left(\frac{\pi}{2} - u\right) = \tan u$$
$$\sec\left(\frac{\pi}{2} - u\right) = \csc u$$
$$\csc\left(\frac{\pi}{2} - u\right) = \sec u$$
$$\tan\left(\frac{\pi}{2} - u\right) = \cot u$$

Identidades de Suma

$$\sin(u + v) = \sin u \cos v + \cos u \sin v$$
$$\cos(u + v) = \cos u \cos v + \sin u \sin v$$
$$\tan(u + v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

Identidades de Resta

$$\sin(u - v) = \sin u \cos v - \cos u \sin v$$
$$\cos(u - v) = \cos u \cos v = \sin u \sin v$$
$$\tan(u - v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

Identidad de Producto a Suma

$$\sin u \sin v = \frac{\sin(u + v) + \sin(u - v)}{2}$$
$$\cos u \cos v = \frac{\cos(u - v) + \cos(u + v)}{2}$$

Identidad de Producto a Resta

$$\sin u \sin v = \frac{\cos(u - v) - \cos(u + v)}{2}$$
$$\cos u \cos v = \frac{\sin(u + v) - \sin(u - v)}{2}$$

Identidad de Suma a Producto

$$\sin u + \sin v = 2\sin\left(\frac{u + v}{2}\right)\cos\left(\frac{u - v}{2}\right)$$
$$\cos u + \cos v = 2\cos\left(\frac{u + v}{2}\right)\cos\left(\frac{u - v}{2}\right)$$

Identidad de Resta a Producto

$$\sin u - \sin v = 2\cos\left(\frac{u + v}{2}\right)\sin\left(\frac{u - v}{2}\right)$$
$$\cos u - \cos v = -2\sin\left(\frac{u + v}{2}\right)\sin\left(\frac{u - v}{2}\right)$$

Identidad Resta de Cuadrados a Producto

$$\sin^2 u - \sin^2 v = \sin(u + v)\ \sin(u - v)$$
$$\cos^2 u - \cos^2 v = -\sin(u + v)\ \sin(u - v)$$
$$\cos^2 u - \sin^2 v = \cos(u + v)\ \cos(u - v)$$

Identidad de Valor Absoluto

$$\sqrt{1 - \sin^2 u} = \sqrt{\cos^2 u} = |\cos u|$$
$$\sqrt{1 - \cos^2 u} = \sqrt{\sin^2 u} = |\sin u|$$
$$\sqrt{\tan^2 u + 1} = \sqrt{sec^2 u} = |sec\, u|$$
$$\sqrt{\sec^2 u - 1} = \sqrt{\tan^2 u} = |\tan u|$$
$$\sqrt{\cot^2 u + 1} = \sqrt{csc^2 u} = |csc\, u|$$
$$\sqrt{csc^2 u - 1} = \sqrt{\cot^2 u} = |\cot u|$$

Tangentes a Senos

$$\frac{1}{\tan(u)} + \frac{1}{\tan(v)} = \frac{\sin(u + v)}{\sin(u)\sin(v)} \qquad \frac{1}{\tan(u)} - \frac{1}{\tan(v)} = \frac{\sin(v - u)}{\sin(u)\sin(v)}$$
$$\frac{1}{\cot(u) + \cot(v)} = \frac{\sin(u)\sin(v)}{\sin(u + v)} \qquad \frac{1}{\cot(u) - \cot(v)} = \frac{\sin(u)\sin(v)}{\sin(v - u)}$$
$$\tan(u) + \tan(v) = \frac{\sin(u+v)}{\sin\left(u+\frac{\pi}{2}\right)\sin\left(v+\frac{\pi}{2}\right)} \qquad \tan(u) - \tan(v) = \frac{\sin(u - v)}{\sin\left(u+\frac{\pi}{2}\right)\sin\left(v+\frac{\pi}{2}\right)}$$
$$\frac{1}{\tan(u) + \tan(v)} = \frac{\sin\left(u+\frac{\pi}{2}\right)\sin\left(v+\frac{\pi}{2}\right)}{\sin(u + v)} \qquad \frac{1}{\tan(u) - \tan(v)} = \frac{\sin\left(u+\frac{\pi}{2}\right)\sin\left(v+\frac{\pi}{2}\right)}{\sin(u - v)}$$

Razones Trigonométricas

$$\sin u = \frac{o}{h} \quad \cos u = \frac{a}{h} \quad \tan u = \frac{o}{a}$$
$$\csc u = \frac{h}{o} \quad \sec u = \frac{h}{a} \quad \cot u = \frac{a}{o}$$

Identidad de Triple Ángulo

$$\sin 3u = 3\sin u - 4\sin^3 u \quad \cos 3u = 4\cos^3 u - 3\cos u \quad \tan 3u = \frac{3\tan u - \tan^3 u}{1 - 3\tan^2 u}$$

CHEATSHEET DE IDENTIDADES TRIGONOMÉTRICAS

Conversiones entre Funciones Sinusoidales			
$\mathbf{\sin u}$	$-\sin u = \sin(u+\pi)$ $-\sin u = \sin(u-\pi)$	$\cos u = \sin\left(u+\frac{\pi}{2}\right)$ $\cos u = \sin\left(u-\frac{3\pi}{2}\right)$	$-\cos u = \sin\left(u+\frac{3\pi}{2}\right)$ $-\cos u = \sin\left(u-\frac{\pi}{2}\right)$
$\sin u = -\sin(u+\pi)$ $\sin u = -\sin(u-\pi)$	$\mathbf{-\sin u}$	$\cos u = -\sin\left(u+\frac{3\pi}{2}\right)$ $\cos u = -\sin\left(u-\frac{\pi}{2}\right)$	$-\cos u = -\sin\left(u+\frac{\pi}{2}\right)$ $-\cos u = -\sin\left(u-\frac{3\pi}{2}\right)$
$\sin u = \cos\left(u+\frac{3\pi}{2}\right)$ $\sin u = \cos\left(u-\frac{\pi}{2}\right)$	$-\sin u = \cos\left(u+\frac{\pi}{2}\right)$ $-\sin u = \cos\left(u-\frac{3\pi}{2}\right)$	$\mathbf{\cos u}$	$-\cos u = \cos(u+\pi)$ $-\cos u = \cos(u-\pi)$
$\sin u = -\cos\left(u+\frac{\pi}{2}\right)$ $\sin u = -\cos\left(u-\frac{3\pi}{2}\right)$	$-\sin u = -\cos\left(u+\frac{3\pi}{2}\right)$ $-\sin u = -\cos\left(u-\frac{\pi}{2}\right)$	$\cos u = -\cos(u+\pi)$ $\cos u = -\cos(u-\pi)$	$\mathbf{-\cos u}$

Soluciones Inversas a Ecuaciones Trigonométricas Simples		
$\sin(u) = \sin(\pi - u)$	$\cos(u) = \cos(2\pi - u)$	$\tan(u) = \tan(u+\pi)$
$a\,sin(bu) = r$	$a\,cos(bu) = r$	$a\tan(bu) = r$
$u_1 = \frac{sin^{-1}\left(\frac{r}{a}\right)}{b}$	$u_1 = \frac{cos^{-1}\left(\frac{r}{a}\right)}{b}$	$u_1 = \frac{tan^{-1}\left(\frac{r}{a}\right)}{b}$
$u_2 = \frac{\pi - sin^{-1}\left(\frac{r}{a}\right)}{b}$	$u_2 = \frac{2\pi - cos^{-1}\left(\frac{r}{a}\right)}{b}$	$u_2 = \frac{tan^{-1}\left(\frac{r}{a}\right) + \pi}{b}$

Composición de Funciones Trigonométricas Inversas en Funciones Trigonométricas						
$(f \circ c)(u)$	$\sin^{-1}$	$\cos^{-1}$	$\tan^{-1}$	csc^{-1}	$\sec^{-1}$	$\cot^{-1}$
sin	u	$\sqrt{1-u^2}$	$\frac{u\sqrt{1+u^2}}{1+u^2}$	$\frac{1}{u}$	$\frac{\sqrt{u^2-1}}{\lvert u\rvert}$	$\frac{\sqrt{1+u^2}}{1+u^2}$
cos	$\sqrt{1-u^2}$	u	$\frac{\sqrt{1+u^2}}{1+u^2}$	$\frac{\sqrt{u^2-1}}{\lvert u\rvert}$	$\frac{1}{u}$	$\frac{u\sqrt{1+u^2}}{1+u^2}$
tan	$\frac{u\sqrt{1-u^2}}{1-u^2}$	$\frac{\sqrt{1-u^2}}{u}$	u	$\frac{\lvert u\rvert}{u}\frac{\sqrt{u^2-1}}{u^2-1}$	$\frac{\lvert u\rvert}{u}\sqrt{u^2-1}$	$\frac{1}{u}$
csc	$\frac{1}{u}$	$\frac{\sqrt{1-u^2}}{1-u^2}$	$\frac{\sqrt{1+u^2}}{u}$	u	$\frac{\lvert u\rvert\sqrt{u^2-1}}{u^2-1}$	$\sqrt{1+u^2}$
sec	$\frac{\sqrt{1-u^2}}{1-u^2}$	$\frac{1}{u}$	$\sqrt{1+u^2}$	$\frac{\lvert u\rvert\sqrt{u^2-1}}{u^2-1}$	u	$\frac{\sqrt{1+u^2}}{u}$
cot	$\frac{\sqrt{1-u^2}}{u}$	$\frac{u\sqrt{1-u^2}}{1-u^2}$	$\frac{1}{u}$	$\frac{\lvert u\rvert}{u}\sqrt{u^2-1}$	$\frac{\lvert u\rvert}{u}\frac{\sqrt{u^2-1}}{u^2-1}$	u