

Trigonometric Functions



1

TRIGONOMETRIC FUNCTIONS - PART I**Trigonometric Functions**

Six trigonometric functions as follows

① $\sin x$

④ $\cos x$

② $\operatorname{cosec} x = \frac{1}{\sin x}, x \neq n\pi$

⑤ $\sec x = \frac{1}{\cos x}, x \neq (2n+1)\frac{\pi}{2}$

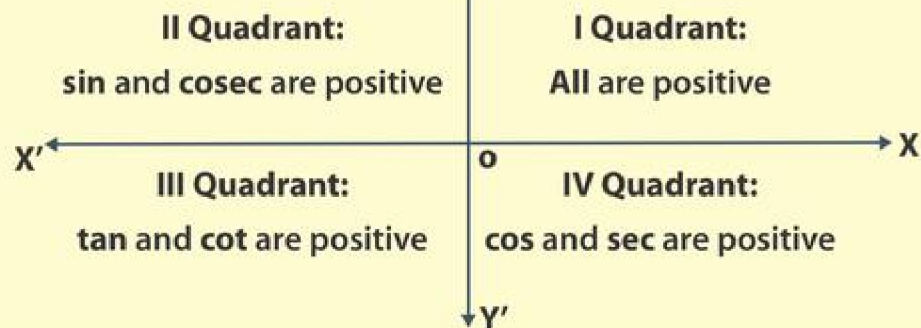
③ $\tan x = \frac{\sin x}{\cos x}, x \neq (2n+1)\frac{\pi}{2}$

⑥ $\cot x = \frac{\cos x}{\sin x}, x \neq n\pi$

Here, n is an integer**Sign Of Trigonometric Functions**

Six trigonometric functions as follows

↑ Y



Domain And Range Of Trigonometric Functions

Function	Domain(n is an integer)	Range
sin	All real numbers	$[-1, 1]$
cos	All real numbers	$[-1, 1]$
tan	All real numbers except $\frac{\pi}{2} + n\pi$	All real numbers
cot	All real numbers except $n\pi$	All real numbers
sec	All real numbers except $\frac{\pi}{2} + n\pi$	$(-\infty, -1] \cup [1, \infty)$
cosec	All real numbers except $n\pi$	$(-\infty, -1] \cup [1, \infty)$

Trigonometric Functions Of Sum And Difference Of Two Angles

- ① $\sin(x + y) = \sin x \cos y + \cos x \sin y$
- ② $\sin(x - y) = \sin x \cos y - \cos x \sin y$
- ③ $\cos(x + y) = \cos x \cos y - \sin x \sin y$
- ④ $\cos(x - y) = \cos x \cos y + \sin x \sin y$
- ⑤ $\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$
- ⑥ $\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$
- ⑦ $\cot(x + y) = \frac{\cot x \cot y - 1}{\cot y + \cot x}$
- ⑧ $\cot(x - y) = \frac{\cot x \cot y + 1}{\cot y - \cot x}$

1 $\sin\left(\frac{\pi}{2} - x\right) = \cos x$ **4** $\cos\left(\frac{\pi}{2} - x\right) = \sin x$ **7** $\sin(\pi + x) = -\sin x$ **10** $\cos(\pi + x) = -\cos x$
2 $\sin\left(\frac{\pi}{2} + x\right) = \cos x$ **5** $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$ **8** $\sin(2\pi - x) = -\sin x$ **11** $\cos(2\pi - x) = \cos x$
3 $\sin(\pi - x) = \sin x$ **6** $\cos(\pi - x) = -\cos x$ **9** $\sin(2\pi + x) = \sin x$ **12** $\cos(2\pi + x) = \cos x$

Trigonometric Functions of Multiple Angles

$$\textcircled{1} \sin 2x = 2\sin x \cos x = \frac{2\tan x}{1 + \tan^2 x}$$

$$\textcircled{4} \cot 2x = \frac{\cot^2 x - 1}{2\cot x}$$

$$\begin{aligned} \textcircled{2} \cos 2x &= \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x \\ &= \frac{1 - \tan^2 x}{1 + \tan^2 x} \end{aligned}$$

⑤ $\sin 3x = 3\sin x - 4\sin^3 x$

$$\textcircled{6} \cos 3x = 4\cos^3 x - 3\cos x$$

$$\textcircled{3} \tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\textcircled{7} \tan 3x = \frac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$$

Factorization Formulae

$$\textcircled{1} \cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right) \quad \textcircled{3} \sin x + \sin y = 2 \sin\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

$$\textcircled{2} \cos x - \cos y = -2\sin\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right) \quad \textcircled{4} \sin x - \sin y = 2\cos\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right)$$

Defactorization Formulae

$$\textcircled{1} \quad 2\cos x \cos y = \cos(x + y) + \cos(x - y)$$

② $-2\sin x \sin y = \cos(x + y) - \cos(x - y)$

③ $2\sin x \cos y = \sin(x + y) + \sin(x - y)$

④ $2\cos x \sin y = \sin(x + y) - \sin(x - y)$

Types Of Solutions

Principal Solution

It is the solution in which
value of variable is in $[0, 2\pi)$

General Solution

All possible set of values of variable which satisfy the trigonometric equation

General Solution Of Some Trigonometric Functions

$$\textcircled{1} \sin x = \sin y \Rightarrow x = n\pi + (-1)^n y \quad \textcircled{4} \sin^2 x = \sin^2 y \Rightarrow x = n\pi \pm y$$

$$\textcircled{2} \cos x = \cos y \Rightarrow x = 2n\pi \pm y \quad \textcircled{5} \cos^2 x = \cos^2 y \Rightarrow x = n\pi \pm y$$

$$\textcircled{3} \tan x = \tan y \Rightarrow x = n\pi + y \quad \textcircled{6} \tan^2 x = \tan^2 y \Rightarrow x = n\pi \pm y$$

Here, n is set of integers

Feedback

MODULES

[Online Classes](#)[Mock Tests](#)[Adaptive Practice](#)[Live Doubts](#)

FEATURES

[Video classes](#)[All India test series](#)[Stories](#)[Live classes](#)[Create your own tests](#)[24/7 Help](#)[All Questions](#)

COMPANY

[About Us](#) • [Brand Resources](#) • [Press](#) • [Customer Stories](#) • [Jobs](#) • [Educators](#) • [Fellowship](#)
• [Learning Planet](#) • [Guides](#) • [Ask](#) • [Blog](#) • [Bytes](#) • [News](#) • [Student Reviews](#) • [Parent Reviews](#)
• [Teacher Reviews](#)

[Terms Of Service](#) • [Privacy Policy](#) • [Contact Us](#) • [FAQs](#)



India ▾

© 2020 Haygot Technologies, Ltd.