

Standard formulae

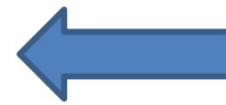
$$1. \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$2. \lim_{x \rightarrow 0} \frac{\sin^{-1} x}{x} = 1$$

$$3. \lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$$

$$4. \lim_{x \rightarrow 0} \frac{\tan^{-1} x}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\sin(2x)}{(2x)} = 1$$



These are all

$\frac{0}{0}$ form

But their limit value is 1

Because in expansion of $\sin x$ the first term is 'x'

$$\lim_{x \rightarrow 0} \frac{\sin\left(\frac{3x}{2}\right)}{\left(\frac{3x}{2}\right)} = 1$$



Vivek Varshney

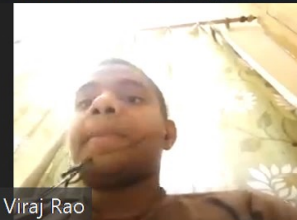
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Aryan Dhiman



Aarish Usmani



Viraj Rao

Standard formulae

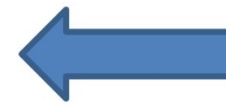
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Method to Solve Limit by Standard Formulae

You are screen sharing



LIVE

Stop Share



Mouse



Select



Text



Draw



Stamp



Spotlight



Eraser



Format



Undo



Redo



Clear



Save



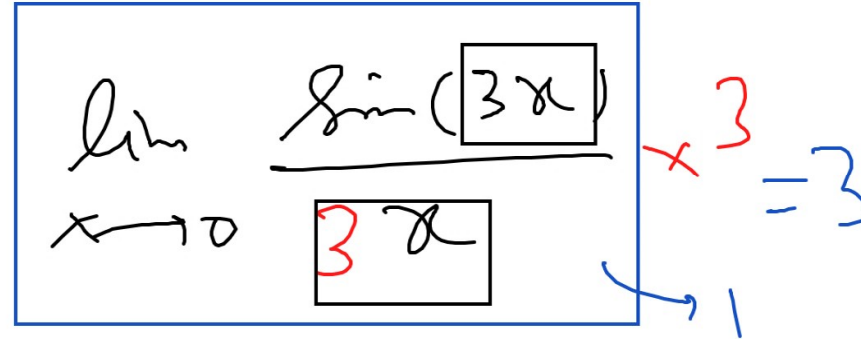
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$$\lim_{x \rightarrow 0} \frac{\sin(3x)}{3x}$$

Talking: Vivek Varshney

These are all

$\frac{0}{0}$ form

But their limit value is 1

Because in expansion of **sin x** & **tan x**,
the first term is 'x'

Method to Solve Limit by Standard Formulae



Standard formulae

* $1. \lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$

* $2. \lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a$

$$3. \lim_{x \rightarrow 0} \frac{(1-x)^n - 1}{x} = -n$$

$$4. \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$$

$\ln e = 1$

These are all

$\frac{0}{0}$ form

Here, in expansion of the numerator
the first term will get divided by
denominator;
Then it will give a non-zero value



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Limit:

Indeterminate Form $\frac{\infty}{\infty}$ form



$\frac{\infty}{\infty}$ form

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$$

Think like to divide numerator and denominator by largest term

when $x \rightarrow a$, $\begin{cases} f(x) \rightarrow \pm\infty \\ g(x) \rightarrow \pm\infty \end{cases}$

ex: $\lim_{x \rightarrow \infty} \frac{x^2 + 1}{2x^2 - x + 2}$

$\Rightarrow \lim_{x \rightarrow \infty} \frac{1 + \frac{1}{x^2}}{2 - \frac{1}{x} + \frac{2}{x^2}} = \frac{1}{2}$

See here x^2 is the largest term
Therefore divide numerator and denominator by x^2



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