LIMIT

DPP 1, 2 — 2, 4, 8.

$\therefore \lim_{x\to 1}\left(1-x+[1-x]+[x-1]\right)=-1$

Q $\lim_{x\to 1}\left(1-x+[x-1]+[1-x]\right)=?$

[ ]

LHL

$\boxed{\begin{matrix} x\to 1^- \\ x=1-h \end{matrix}}$

$\lim_{h\to 0}\left(1-(1-h)+[1-h-1]+[1-(1-h)]\right)$

$\lim_{h\to 0}\left(h+[0-h]+[0+h]\right)$

$\lim_{h\to 0}\boxed{h}+(-1)+0$ $=0+-1$

$=-1$

RHL

$x=1+h$

$\lim_{h\to 0}\left(1-(1+h)+[1+h-1]+[1-(1+h)]\right)$

$\lim_{h\to 0}\left(-h+[0+h]+[0-h]\right)$

$\lim_{h\to 0}\cancel{-h}+0+-1$

-1

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LIMIT

Q $\lim_{x\to\infty} \sec^{-1}\left(\frac{x}{x+1}\right) =$ Not Defined

$x < x+1$

$\frac{x}{x+1} < 1$

$\sec^{-1}(<1)$

Not in Domain

Q (Mains) $\lim_{x\to 0^-} \frac{x([x]+|x|)\sin[x]}{|x|}$

" $-\sin 1$

$\sin 1$

1

0

LHL Demanded

$x = -h$

$\lim_{h\to 0} \frac{-h([0-h]+|-h|)\sin[0-h]}{|-h|}$

$\lim_{h\to 0} \frac{-\cancel{h}(-1+h)\sin(-1)}{\cancel{h}}$

$\lim_{h\to 0} -(1-h)\cdot\sin(1) = -(1-0)\sin 1 = -\sin 1$

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LIMIT

Q $\lim\limits_{\boxed{x\to 1^+}} \dfrac{(1-|x|+\sin|1-x|)\sin\left(\frac{\pi}{2}[1-x]\right)}{|1-x|\,[1-x]}$

Mains

A) 0 C) -1
B) ONE D) 2

RHL Demanded

$x = 1+h$

$$\lim_{h\to 0}\frac{(1-|1+h| + \sin|1-(1+h)|)\sin\left(\frac{\pi}{2}[1-(1+h)]\right)}{|1-(1+h)|\,[1-(1+h)]}$$

$$\lim_{h\to 0}\frac{(1-(1+h)+\sin(h))\sin\left(\frac{\pi}{2}[0-h]\right)}{|-h|\,[0-h]}$$

$$\lim_{h\to 0}\frac{(-h+\sin h)\sin\left(-\frac{\pi}{2}\right)}{h\,(-1)} = \frac{-1(-h+\sin h)}{-h} = \lim_{h\to 0}\frac{h-\sin h}{-h} = \lim_{h\to 0} \boxed{-1} + \frac{\sin h}{h}$$

Thode Din tk yad Karlo

1) $\lim\limits_{x\to 0}\dfrac{\sin x}{x} = 1$

2) $\lim\limits_{x\to 0}\dfrac{\tan x}{x} = 1$

$-1+1=0$

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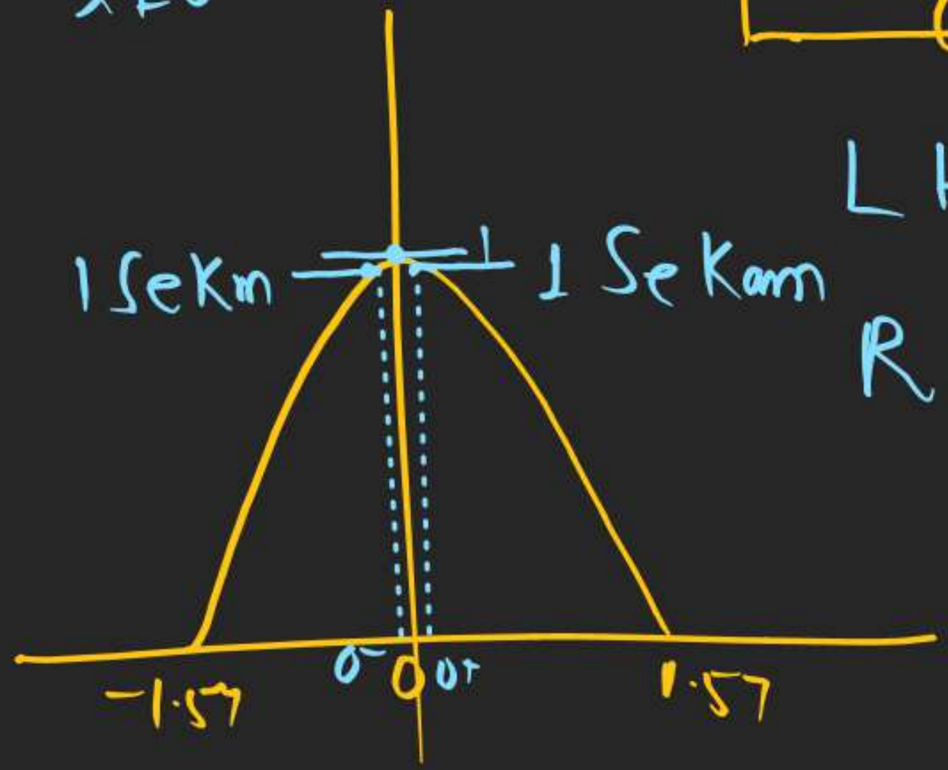
LIMIT

Q $\lim_{x \to 0} [\cos x]$

$x \neq 0$

$\boxed{[\text{Trigo}] \text{ then Use graph at given Limit}}$



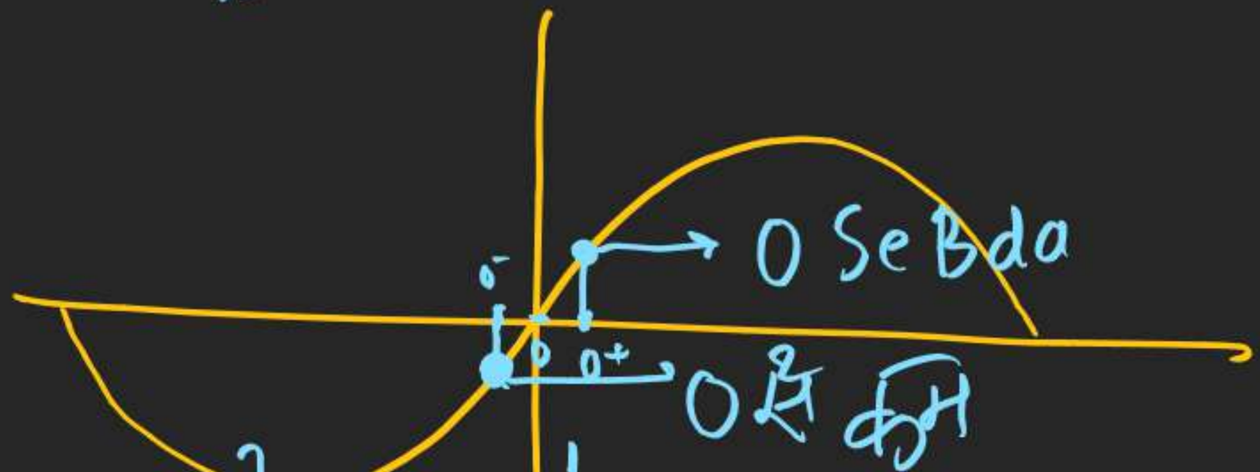
$LHL = [\cos(0-h)] = [\text{less than } 1] = 0$

$RHL = [\cos(0+h)] = [\text{less than } 1] = 0$

$\therefore \lim_{x \to 0} [\cos x] = 0$

Q $\lim_{x \to 0} [\sin x]$

$x \neq 0$



$LHL = [\sin(0-h)] = [\text{less than } 0] = -1$

$RHL = [\sin(0+h)] = [\text{Gr than } 0] = 0$

LDNE

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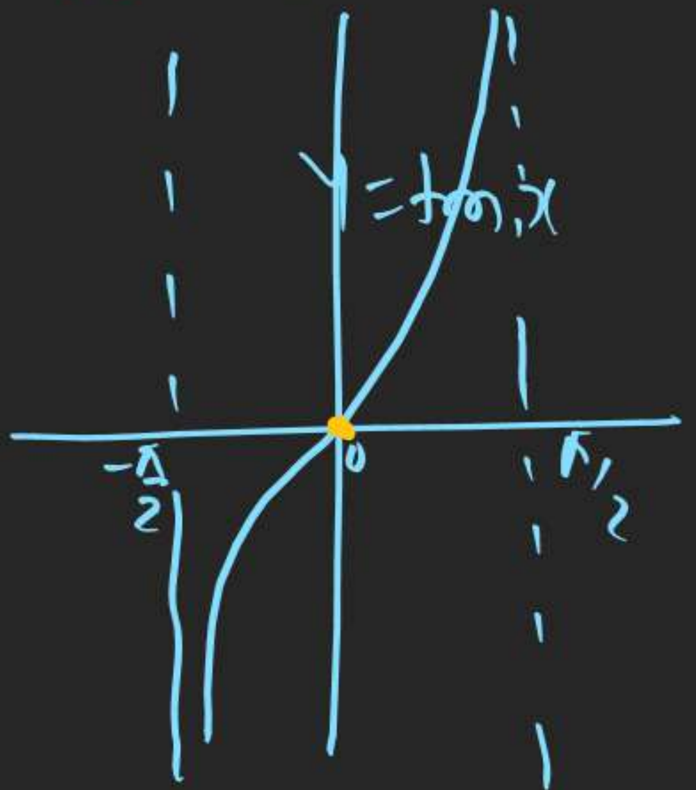
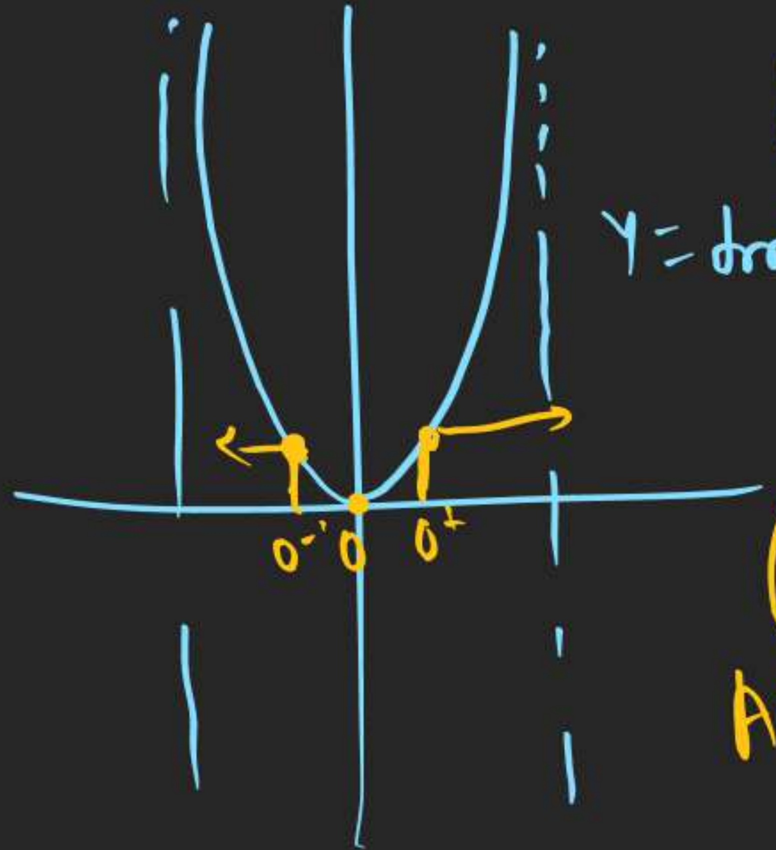
LIMIT

Q $\lim_{x \to 0} [\tan^2 x]$





$LHL = [\tan^2(0-h)] = [\text{Gr than } 0] = 0$

$RHL = [\tan^2(0+h)] = [\text{Gr than } 0] = 0$

$\lim_{x \to 0} [\tan^2 x] = 0$

Q Adv. Check $\boxed{\text{Cont}^y}$ of $y = \underline{[\tan^2 x]}$ at $\boxed{x = 0}$

Next chapter

$LHL = [\tan^2(0-h)] = 0$

$RHL = [\tan^2(0+h)] = 0$

$f(0) = [0] = 0$

fxn in Conts

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LIMIT

Q Sheets $\lim_{x\to 0} \frac{\sin[\cos x]}{1+[\cos x]}$ $\lim_{x\to 0}[\cos x]=0$

$$\frac{\sin 0}{1+0}=\frac{0}{1}=0$$

HW Q $\lim_{x\to 2^-} [2-x]+[x-2]-x$ (-3)

ω Ans of L in Normal one $\Rightarrow$ LDE

$\Rightarrow$ LHL = RHL $\Rightarrow \left|\frac{1}{\lambda}\right|=\left|\frac{1}{\lambda-1}\right| \Rightarrow |\lambda|=|\lambda-1|$

$\times$ $\lambda=\lambda-1$, $0=-1$ $\lambda=-(\lambda-1)$, $2\lambda=1 \Rightarrow \boxed{\lambda=\frac{1}{2}}$

Q [ ] GIF If for some $\lambda\in R-\{0,1\}$ Main 2020

$\lim_{x\to 0}\left|\frac{1-x+|x|}{\lambda-x+[x]}\right|=L$ then $L=?$ $\frac{1}{2}$, 0, 2, 1

LHL $\lim_{h\to 0}\left|\frac{1-(-h)+|-h|}{\lambda-(-h)+[-h]}\right|=L$

$\lim_{h\to 0}\left|\frac{1+h+h}{\lambda+h-1}\right|=L \Rightarrow \left|\frac{1}{\lambda-1}\right|=L \to 2$

RHL $\lim_{h\to 0}\left|\frac{1-h+|h|}{\lambda-h+[h]}\right|=L$

$\lim_{h\to 0}\left|\frac{1-\cancel{h}+\cancel{h}}{\lambda-h+0}\right|=L \Rightarrow \left|\frac{1}{\lambda}\right|=L$

$L=\left|\frac{1}{1/2}\right|=2$

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LIMIT

Q $\lim_{x\to 8}\{x\}$ Aakashan

LHL

$x\to 8^-$

$\lim_{h\to 0}\{8-h\}$

$\{-h\}$

$\lim_{h\to 0} 1-h$

$1-0$

$=1$

RHL

$x\to 8^+$

$\lim_{h\to 0}\{8+h\}$

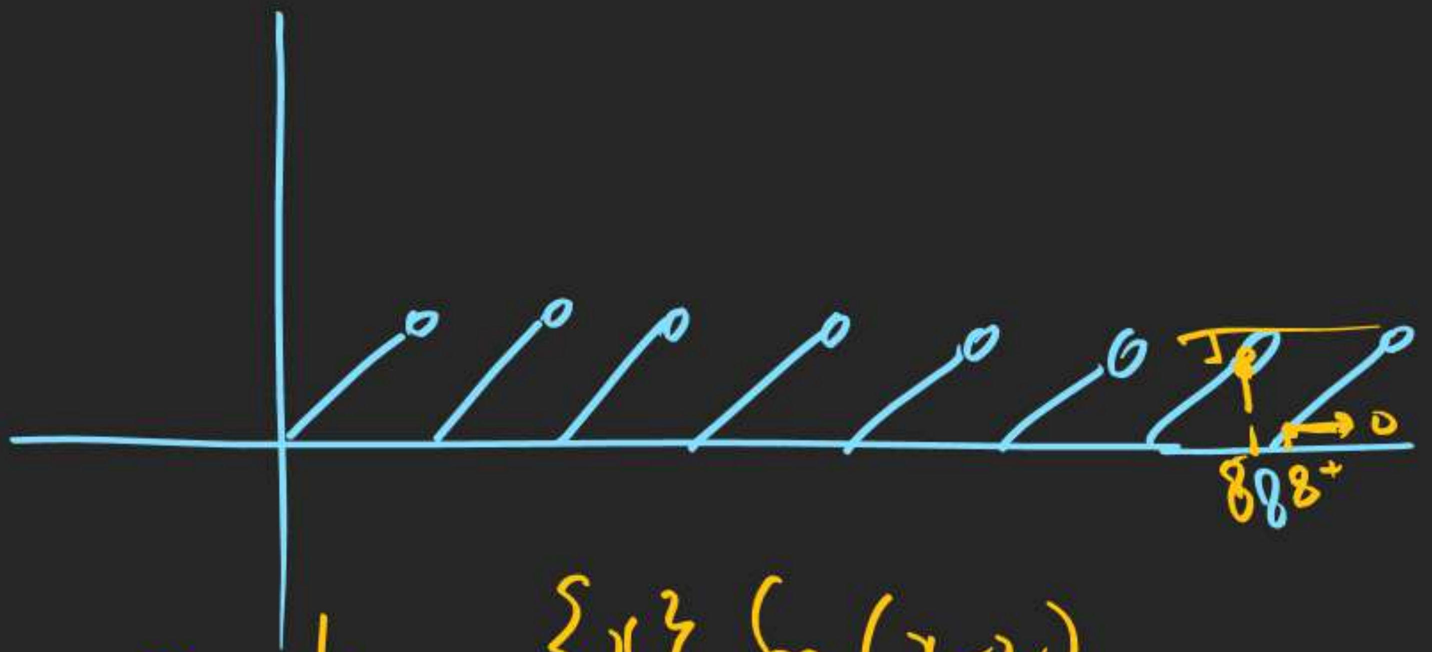
$\{h\}$

$=\lim_{h\to 0} h$

$=0$

$\therefore$ LHL=RHL

LDNE



Q $\lim_{x\to 2^+}\dfrac{\{x\}\ln(x-2)}{(x-2)^2}=?$

RHL Demanded

$x=2+h$

$$\lim_{h\to 0}\frac{\{2+h\}\ln(\cancel{2}+h-\cancel{2})}{(\cancel{2}+h-\cancel{2})^2}=\lim_{h\to 0}\frac{\{h\}\ln h}{h^2}$$

$$\lim_{h\to 0}\frac{\cancel{h}\times\ln\cancel{h}}{\cancel{h^2}}=1$$

LIMIT

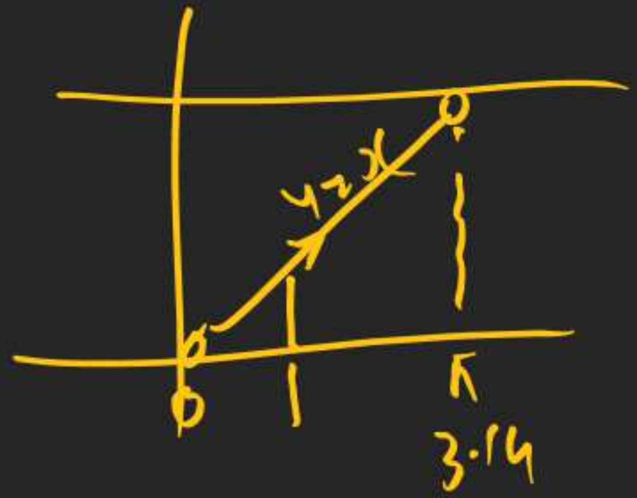
Q $\lim_{x\to 0^-} \cot^{-1}\left(\{x\}\cot\{x\}\right) = ?$

$x = 0-h$ $\quad \lim_{h\to 0} \cot^{-1}\left(\{-h\}\cot\{-h\}\right)$

$\lim_{h\to 0} \cot^{-1}\left((1-h)\cot(1-h)\right)$

$\cot^{-1}\left((1-0)\cot(1-0)\right)$

$\cot^{-1}(\cot 1) = 1$



$\{-h\} = 1-h$

$\{-.2\} = 1-.2$

$\{.2\} = .2$

Q $\lim_{x\to 0^+} \frac{\tan^2\{x\}}{x^2-[x]^2}$

$x = 0+h$

$\lim_{h\to 0} \frac{\tan^2\{h\}}{h^2-[0+h]^2}$

$\lim_{h\to 0} \frac{\tan^2 h}{h^2-0} = \lim_{h\to 0}\left(\frac{\tan h}{h}\right)^2 = 1^2 = 1$

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LIMIT

Q If
$$f(x)=\begin{cases}\dfrac{\tan^2\{x\}}{x^2-[x]^2} & x>0\\ 1 & x=0\\ \cot^{-1}(\{x\}\cot\{x\}) & x<0\end{cases}$$

RHL

Defined fxn.

then find $\lim_{x\to 0} f(x)=?$

LHL
RHL

LHL $\boxed{x=0-h} \to x<0$

$$\lim_{x\to 0^-} \cot^{-1}(\{x\}\cot\{x\})$$
$= 1$

RHL $\boxed{x=0+h} \to x>0$

$$\lim_{x\to 0^+} \frac{\tan^2\{x\}}{x^2-[x]^2}$$
$= 1$

LHL = RHL

$\lim_{x\to 0} f(x) = 1$

$\to$ Nxt Chapter Aise Qs Se Bhra Pda Rahega

LHL = 1
RHL = 1
f(0) = 1

$\Big\}$ Cont^s at $x=0$

LIMIT

Q $f(x) = \begin{cases} \boxed{x-1} & \boxed{x \geq 1} \\ 2x^2-2 & x<1 \end{cases}$, $g(x) = \begin{cases} \boxed{x+1} & \boxed{x>0} \\ -x^2+1 & x \leq 0 \end{cases}$ & $\underline{r(x) = |x|}$

$r(0-h) = |-h|$

find $\lim\limits_{x \to 0} f(g(\boxed{r(x)}))$

$\therefore \lim\limits_{x \to 0} f(g(r(x)))$
$= 0$

LHL $\lim\limits_{x \to 0^-} f(g(r(0-h)))$

$\lim\limits_{h \to 0} f(g(|-h|))$

$\lim\limits_{h \to 0} f(g(\boxed{h}))$ → 0 से Bda

$\lim\limits_{h \to 0} f(h+1)$ → f में 1 से Bda

$= (h+\cancel{1}) - \cancel{1} = 0$

RHL $\lim\limits_{x \to 0^+} f(g(\underline{r(0+h)}))$

$\lim\limits_{h \to 0} f(g(|h|))$

$\lim\limits_{h \to 0} f(\boxed{g}(h))$ → 0 से Bda

$\lim\limits_{h \to 0} f(h+1) = \lim\limits_{h \to 0} (h+1) - 1$

$= 0$

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LIMIT

Concept

$\frac{1}{.9} = 1$ से Bda $\quad \Big| \quad \frac{1}{1.1} = 1$ से Kam

$\frac{10}{9} =$ " $\qquad \frac{10}{11} =$ "

Q $\lim_{x \to 1} \left[x \left[\frac{1}{x} \right] \right]$

LHL $x = 1 - h$

$\lim_{h \to 0} \left[(1-h) \left[\frac{1}{1-h} \right] \right]$

1 से Bda

$[(1-h) \times 1]$

$[1-h] = 0$

RHL $x = 1 + h$

$\lim_{h \to 0} \left[(1+h) \left[\frac{1}{1+h} \right] \right]$

1 से Kam

$[(1+h) \times 0]$

$[0] = 0$

$\therefore \lim_{x \to 1} \left[x \left[\frac{1}{x} \right] \right] = 0$

$\lim_{t\to 0}\left(\frac{23}{t^2}\right)\to\infty$

Q Difficult: Make Graph of fxn.

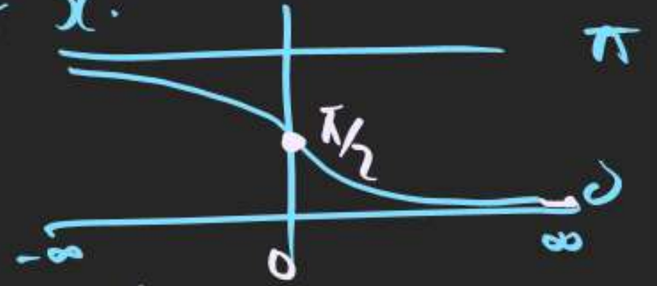
$f(x) = \lim_{\boxed{t\to 0}} \frac{2x}{\pi}\cdot\cot^{-1}\frac{x}{t^2} = ?$

thought → 1) here we have 2 variable. x & t

2) t → 0 given But we do not have.

Idea about x.

3)



$\lim_{t\to 0}\left(\frac{-23}{t^2}\right)\to-\infty$

$x = -ve$ | $x = +ve$ | $x = 0$ ✓

x = -ve

$\lim_{t\to 0}\frac{2x}{\pi}\cot^{-1}\left(\frac{x}{t^2}\right)$ (x → -ve, t^2 → +)

$\frac{2x}{\pi}\cdot\cot^{-1}(-\infty)$

$Y=\frac{2x}{\cancel{\pi}}\times\cancel{\pi}$ $\quad\boxed{Y=2x}$

x = +ve

$Y=\lim_{t\to 0}\frac{2x}{\pi}\cot^{-1}\left(\frac{x}{t^2}\right)$

$\frac{2x}{\pi}\cdot\cot^{-1}(\infty)$

$Y=\frac{2x}{\pi}\times 0 \Rightarrow Y=0$

x = 0

$Y=\frac{2x}{\pi}\cot^{-1}\left(\frac{0}{t^2}\right)$

$\lim_{t\to 0}\frac{2x}{\pi}\cdot\cot^{-1}(0)$

$\frac{2x}{\cancel{\pi}}\cdot\frac{\cancel{\pi}}{2}=x=0$

x = -ve

x = +ve →

Q $\lim_{x \to 0^+} \frac{x}{a}\left[\frac{b}{x}\right]$ $a, b \neq 0$

$0 \times \infty$

$\lim_{h \to 0} \frac{h}{a}\left[\frac{b}{h}\right]$

$[x] = x - \{x\}$

$\{x\} \in [0,1)$

M1 $\lim_{h \to 0} \frac{h}{a}\left(\frac{b}{h} - \left\{\frac{b}{h}\right\}\right)$

$\frac{b}{a} - \lim_{h \to 0} \frac{h}{a} \cdot \left\{\frac{b}{h}\right\}$

$\frac{b}{a} - \lim_{h \to 0} \frac{h}{a} \times$ (any value betn 0 to 1)

$\frac{b}{a} - \frac{0}{a} \times (0 \text{ to } 1) = \frac{b}{a} - 0 = \frac{b}{a}$

M2 funda

$\boxed{\lim_{x \to \infty} [x] = x}$

$\lim_{h \to 0} \frac{h}{a}\left[\frac{b}{h}\right]$ Indicate to ∞

$\lim_{h \to 0} \frac{K}{a} \times \frac{b}{K}$

$= \frac{b}{a}$

Mains

Q $\lim_{x \to 0^+} x\left(\left[\frac{1}{x}\right] + \left[\frac{2}{x}\right] + \dots + \left[\frac{15}{x}\right]\right)$ $\frac{1}{0} \to \infty$ $\frac{2}{0} \to \infty$

$\Rightarrow x\left(\frac{1}{x} + \frac{2}{x} + \frac{3}{x} + \dots + \frac{15}{x}\right) = 1 + 2 + 3 + \dots + 15$

$= \frac{(15)(\cancel{16})^8}{\cancel{2}} = 120$

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DPP2

Sur → Onto ✓ Ran = ...

× Inj → 1-2-1

$f(x) = \tan^{-1} x$

$f'(x) = \dfrac{1}{1+x^2}$

1) $f : R \to \left[\dfrac{\pi}{6}, \dfrac{\pi}{4}\right)$ $\quad f(x) = \tan^{-1}\left(\dfrac{x^2+1}{x^2+\sqrt{3}}\right)$

$y = \dfrac{x^2+1}{x^2+\sqrt{3}} \to \dfrac{\oplus}{\oplus}$

$x^2 y + \sqrt{3} y = x^2 + 1$

$x^2(y-1) = 1 - \sqrt{3} y$

$x^2 = \dfrac{1-\sqrt{3}y}{y-1} \geq 0$

$\dfrac{(\sqrt{3}y-1)}{(y-1)} \leq 0$

$+ \quad - \quad +$

$\dfrac{1}{\sqrt{3}} \qquad 1$

$f'(x) = \dfrac{1}{1+\left(\dfrac{x^2+1}{x^2+\sqrt{3}}\right)^2} \times \dfrac{(x^2+\sqrt{3})2x - (x^2+1)2x}{(x^2+\sqrt{3})^2}$

$= \dfrac{1}{1+\left(\dfrac{x^2+1}{x^2+\sqrt{3}}\right)^2} \times \dfrac{\cancel{2x^3} + 2\sqrt{3}x - \cancel{2x^3} - 2x}{(x^2+\sqrt{3})^2}$

$f'(x) = \dfrac{1+}{1+(\quad)^2} \times \left(\dfrac{\overset{\oplus}{2}x(\overset{\oplus}{\sqrt{3}-1})}{(x^2+\sqrt{3})^{\overset{2}{\oplus}}}\right)$

$+ \quad \oplus$

$y \in \left[\dfrac{1}{\sqrt{3}}, 1\right)$

$\dfrac{x^2+1}{x^2+\sqrt{3}} \in \left[\dfrac{1}{\sqrt{3}}, 1\right)$

$\tan^{-1}\left(\dfrac{x^2+1}{x^2+\sqrt{3}}\right) \in \left[\tan^{-1}\dfrac{1}{\sqrt{3}}, \tan^{-1} 1\right)$

$\in \left[\dfrac{\pi}{6}, \dfrac{\pi}{4}\right)$

$f'(x)$ → +ve, → -ve

M|21

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Q 4 $\sin^{-1}\left((\log x)^2 - 2\log x + 2\right) + \tan^{-1}\left((\log x)^2 - 2\log x + 2\right) + \cos^{-1}\left((\log x)^2 - 2\log x + 2\right)$

$1^2 - 2 \quad 2$

$(1^2 - \cancel{2} \times 1 + \cancel{2})$

$-1 \leq \boxed{(\log x)^2 - 2\log x + 2} \leq 1$

$-1 \leq \boxed{(\log_{10} x - 1)^2} + 1 \leq 1$

$\log_{10} x - 1 = 0$

$\log_{10} x = 1$

$\underline{x = 10}$

$\sin^{-1}(1) + \tan^{-1}(1) + \cos^{-1}(-1)$

$\frac{\pi}{2} + \frac{\pi}{4} + \pi = P$

$P = \frac{7\pi}{4}$