Nishant Jindal

Q $I=\int_0^{\pi/2}\frac{x\sin x\cos x}{\sin^4x+\cos^4x}\cdot dx$

Ans

$=\frac{\pi}{4}\int_0^{\pi/2}\frac{\sin x\cos x}{\sin^4x+\cos^4x}\cdot dx \quad \div\cos^4x$

$=\frac{\pi}{4}\int_0^{\pi/2}\frac{\tan x\cdot\sec^2x}{1+(\tan^2x)^2}dx$

$\tan^2x=t$

$2\tan x\cdot\sec^2x\,dx=dt$

x	t
0	0
$\frac{\pi}{2}$	∞

$=\frac{\pi}{4\times2}\int_0^{\infty}\frac{dt}{1+t^2}=\frac{\pi}{8}\left(\tan^{-1}t\right)_0^{\infty}$

$=\frac{\pi}{8}\left(\frac{\pi}{2}-0\right)=\frac{\pi^2}{16}$

$20\to390+Qs$

Achha.

Q $I=\int_0^{\pi/4}\frac{x\,dx}{1+\sin2x+\cos2x}=\boxed{\frac{\pi\ln2}{b}}$ find b?

Removal of x.

$=\frac{\pi}{8}\int_0^{\pi/4}\frac{dx}{2\cos^2x+2\sin x\cos x}$

$=\frac{\pi}{8}\int_0^{\pi/4}\frac{dx}{2\cos^2x(1+\tan x)}$

$=\frac{\pi}{8\times2}\int_0^{\pi/4}\frac{\sec^2x\,dx}{1+\tan x}$

$1+\tan x=t$

$\sec^2x\,dx=dt$

x	t
0	1
$\frac{\pi}{4}$	2

$=\frac{\pi}{16}\int_1^2\frac{dt}{t}=\frac{\pi}{16}\times\ln|t|\Big|_1^2=\boxed{\frac{\ln2\cdot\pi}{16}}$

$b=16$

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Q. $\int_0^{\pi/4} \frac{x\,dx}{\cos x(\sin x+\cos x)} = ?$

Pichhla Qs.

Q If $I_1 = \int_K^{1-K} x\cdot F(x(1-x))\,dx$ (Adv)

$I_2 = \int_K^{1-K} F(x(1-x))\,dx$

then $\frac{I_1}{I_2} = ?$

I_1, I_2 has one difference "x"

$F(x(1-x)) \xrightarrow[K+1-K-x]{x} F(1-x(K-(K-x)))$

$= F((1-x)(x))$

Removal of x

$I_1 = \frac{K+1-K}{2} \boxed{\int_K^{1-K} F(x(1-x))\,dx}$

$I_1 = \frac{1}{2} I_2 \Rightarrow \frac{I_1}{I_2} = \frac{1}{2}$

Q $I_1 = \int_{-\tan^2 t}^{1+\sec^2 t} x\left(g(x(2-x))\right)dx$ (Adv)

$I_2 = \int_{-\tan^2 t}^{1+\sec^2 t} g(x(2-x))\,dx$

then $\frac{I_1}{I_2} = \frac{1+\sec^2 t-\tan^2 t}{2}$

$= 1$

Mains Q Value of

$I = \int_0^{2\pi} \left[\sin 2x(1+\cos 3x)\right]dx \rightarrow (A)$

Pr 4 $(x \rightarrow 2\pi - x)$

$= \int_0^{2\pi} \left[\sin 2(2\pi-x)\left(1+\cos 3(2\pi-x)\right)\right]dx$

$4\pi, 6\pi$

$= \int_0^{2\pi} \left[\sin(4\pi-2x)\left(1+\cos(6\pi-3x)\right)\right]dx$

$\int_0^{2\pi} \left[-\sin 2x\left(1+\cos 3x\right)\right]dx \rightarrow (B)$

$I = \ldots$

$2I = (A+B) = \int_0^{2\pi} -1\,dx = (-x)_0^{2\pi} = -2\pi$

$I = -\pi$

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Q. Let $f:(0,2)\to R$.

Hold

$f(x)=\log_2\left(1+\tan\frac{\pi x}{4}\right)$

then $\lim_{n\to\infty}\frac{2}{n}\left(f\left(\frac{1}{n}\right)+f\left(\frac{2}{n}\right)+\cdots+f\left(\frac{n}{n}\right)\right)=?$

Propertys :- Property Based on

For Prft of Mains/Adv.

Even / odd fxn.

$$\int_{-a}^{a}f(x)\cdot dx=\begin{cases}0 & f(x)=\text{odd}\\ 2\int_0^a f(x)dx & f(x)=\text{Even}\\ \int_0^a f(x)+f(-x)dx & f(x)=\text{Neno}\end{cases}$$

Pehchan $\to \int_{-1/2}^{1/2}f(x)$, $\int_{-1}^{+1}f(x)$, $\int_{-a}^{+a}f(x)$

$\int_{-\pi/2}^{\pi/2}f(x)$ $\quad\int_{\ln\sqrt{\lambda}}^{\ln\left(\frac{1}{\sqrt{\lambda}}\right)}f(x)$

①

$f(x)=\text{odd}$

$\int_{-a}^{a}f(x)\cdot dx=A+-A$
$=0$

②

$f(x)=\text{Even}$

$\int_{-a}^{a}f(x)\cdot dx=2\int_0^a f(x)\cdot dx$

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Q $\int_{-1}^{1} \{x^2+1\}\{x+1\} + \{x+2\}\{x^2+2\}\, dx$

$\int_{-1}^{1} \{x^2\}\{x\} + \{x^2\}\{x\}\, dx$

$\frac{2}{3}$

$2\int_{-1}^{1} \{x^2\}\{x\}\, dx$

NENO $\int_{-a}^{a} f(x)\,dx = \int_{0}^{a} f(x) + f(-x)\,dx$

$2\int_{0}^{1} \{x^2\}\{x\} + \{(-x)^2\}\{-x\}\, dx$

$2\int_{0}^{1} \{x^2\}\left(\{x\} + \{-x\}\right) dx$

$$\boxed{\{x\}+\{-x\} = \begin{cases} 0 & x = I \\ 1 & x \neq I \end{cases}}$$

$x \in (0,1) \to x$: Non Integer = Decimal No

$2\int_{0}^{1} \{x^2\} \times 1\, dx = 2\int_{0}^{1} x^2\, dx = \frac{2x^3}{3}\Big|_0^1$

$\{x\} = x$

$\{.9\} = .9,\ \{.4\} = .4$

Q $\int_{-1}^{1} x^3 \cdot dx = ?$ 0

Q $\int_{-1}^{1} x^3 \cdot \sin(x^7)\, dx \neq 0$

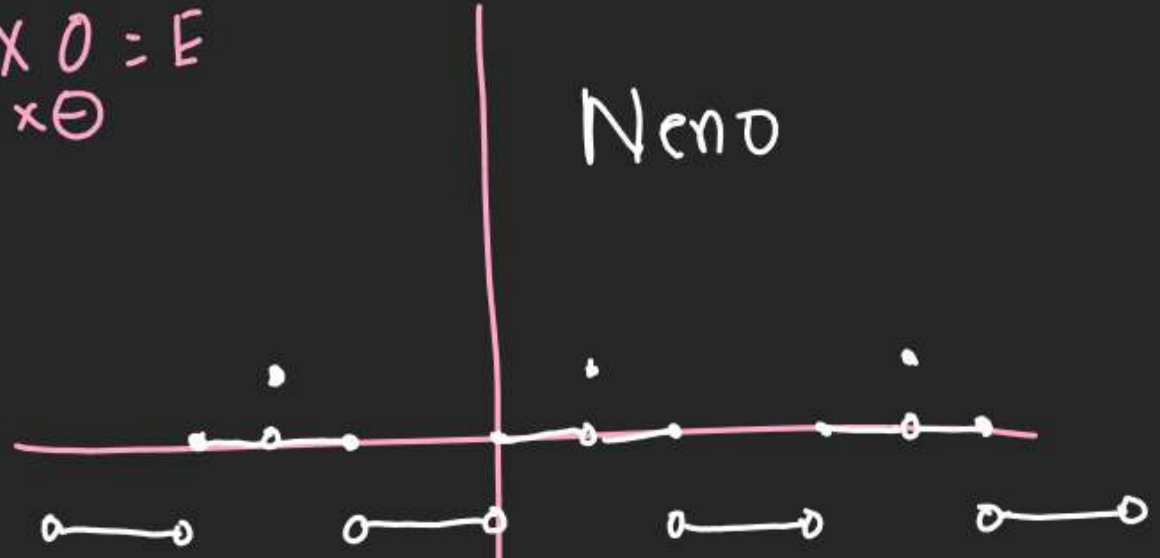
$[\sin x]$

O O(O)

O × O = E

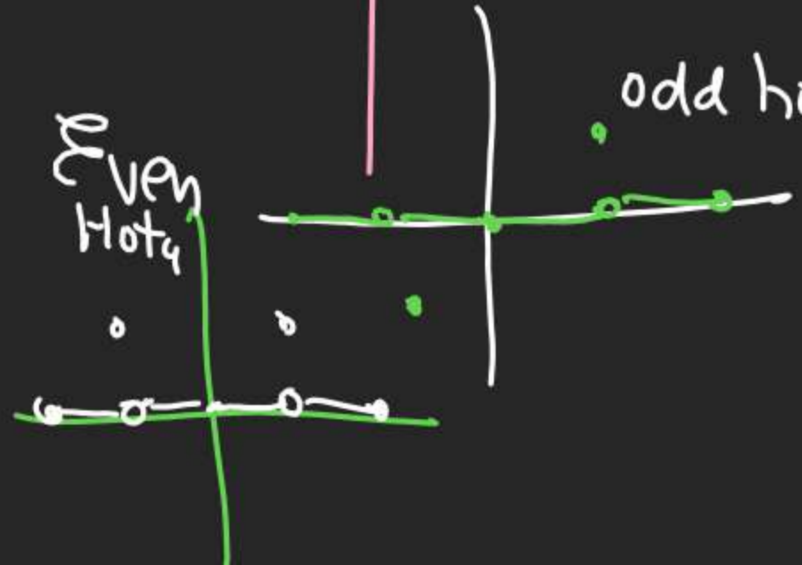
Θ × Θ

Neno



Even Hoty

odd hoty



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Q $I=\int_{-\pi}^{\pi}[\sin x]\,dx$

Memo $[x]+[-x]=\begin{cases}0 & x=I\\ -1 & x\neq I\end{cases}$

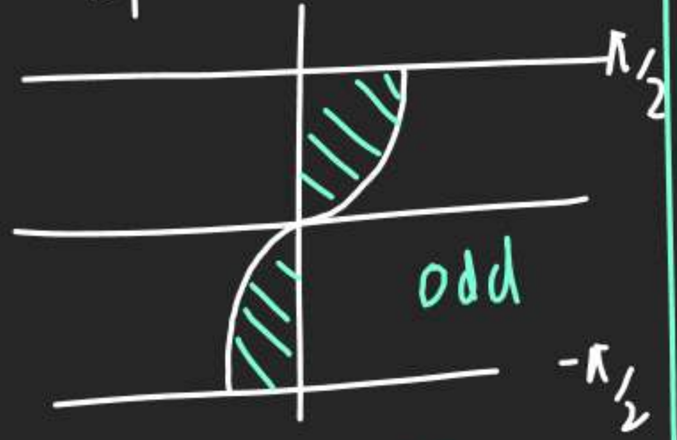
$=\int_{0}^{\pi}[\sin x]+[\sin(-x)]\,dx$

$=\int_{0}^{\pi}[\sin x]+[-\sin x]\,dx$

$I=\int_{0}^{\pi}-1\cdot dx=-(x)_{0}^{\pi}$

$I=-\pi$

Q $\int_{-1}^{1}\cancel{\sin^{-1}x}\cdot dx$

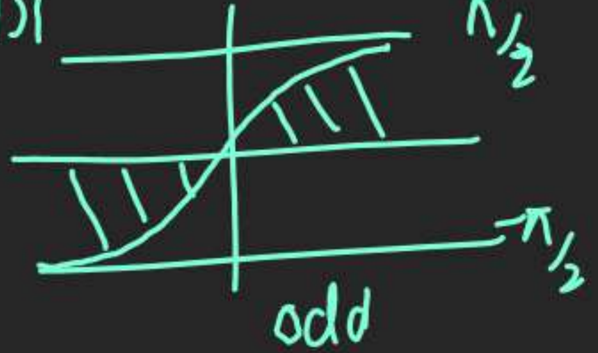


$=0$

Q $\int_{-1}^{1}\sin^{-1}\left(\frac{2x}{1+x^2}\right)dx$

$\Rightarrow\int_{-1}^{1}2\tan^{-1}(x)\,dx$

$2\int_{-1}^{1}\cancel{\tan^{-1}x}\cdot dx$



$=2\times0=0$

Q $\int_{-1/2}^{1/2}\sec x\cdot\ln\left(\frac{1-x}{1+x}\right)\cdot dx=0$

E × odd = odd

(+) × (−) = (−)

Nishant Jindal

Q $\displaystyle\int_{-\pi/4}^{\pi/4} \frac{x^7-3x^5+3x^3-x+1}{\cos^2 x}\,dx$

$\displaystyle\int_{-\pi/4}^{\pi/4} \cancel{\frac{x^7}{\cos^2 x}}_{O/E} - \cancel{\frac{3x^5}{\cos^2 x}}_{O/E} + 3\cancel{\frac{x^3}{\cos^2 x}}_{O/E} - \cancel{\frac{x^1}{\cos^2 x}}_{O/E} + \frac{1}{\cos^2 x}\,dx$

$\displaystyle = 2\int_0^{\pi/4} \sec^2 x = 2\times \tan x\Big|_0^{\pi/4} = 2$

???

Q $\displaystyle\int_{-\pi/2}^{\pi/2} \underbrace{\sin x}_{\text{Odd}} \cdot \underbrace{f(\cos x)}_{f(\text{Even})}\,dx = 0$

Odd × Even

$\ominus \times \oplus = \ominus = \text{odd}$

Q $\displaystyle\int_{-1}^{1} \frac{2x^{332}+x^{998}+4x^{1668}\cdot\sin x^{691}}{(1+x^{666})}\,dx = ?$

$\displaystyle\int_{-1}^{1} \frac{x^{332}}{1+(x^{333})^2}\,dx + \int_{-1}^{1} \frac{x^{332}\cancel{(1+x^{666})}}{\cancel{1+x^{666}}}\,dx + 4\int_{-1}^{1} \frac{x^{1668}\cdot\sin x^{691}}{1+x^{666}}\,dx$

$x^{333} = t$

E × odd = odd

Even

$\dfrac{\oplus \times \ominus}{\oplus} = \ominus$

$\displaystyle 333\int_{-1}^{1} \frac{dt}{1+t^2} + \frac{x^{333}}{333}\Big|_{-1}^{1} + 4\times 0$

$\displaystyle 333\cdot \tan^{-1} t\Big|_{-1}^{1} + \left(\frac{1}{333}+\frac{1}{333}\right)$

$\displaystyle 333\left(\frac{\pi}{4}+\frac{\pi}{4}\right) + \frac{2}{333}$

Prop 6

King

49 - 51

52 - 56 + 38 - 41

37

56