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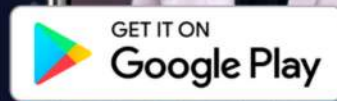
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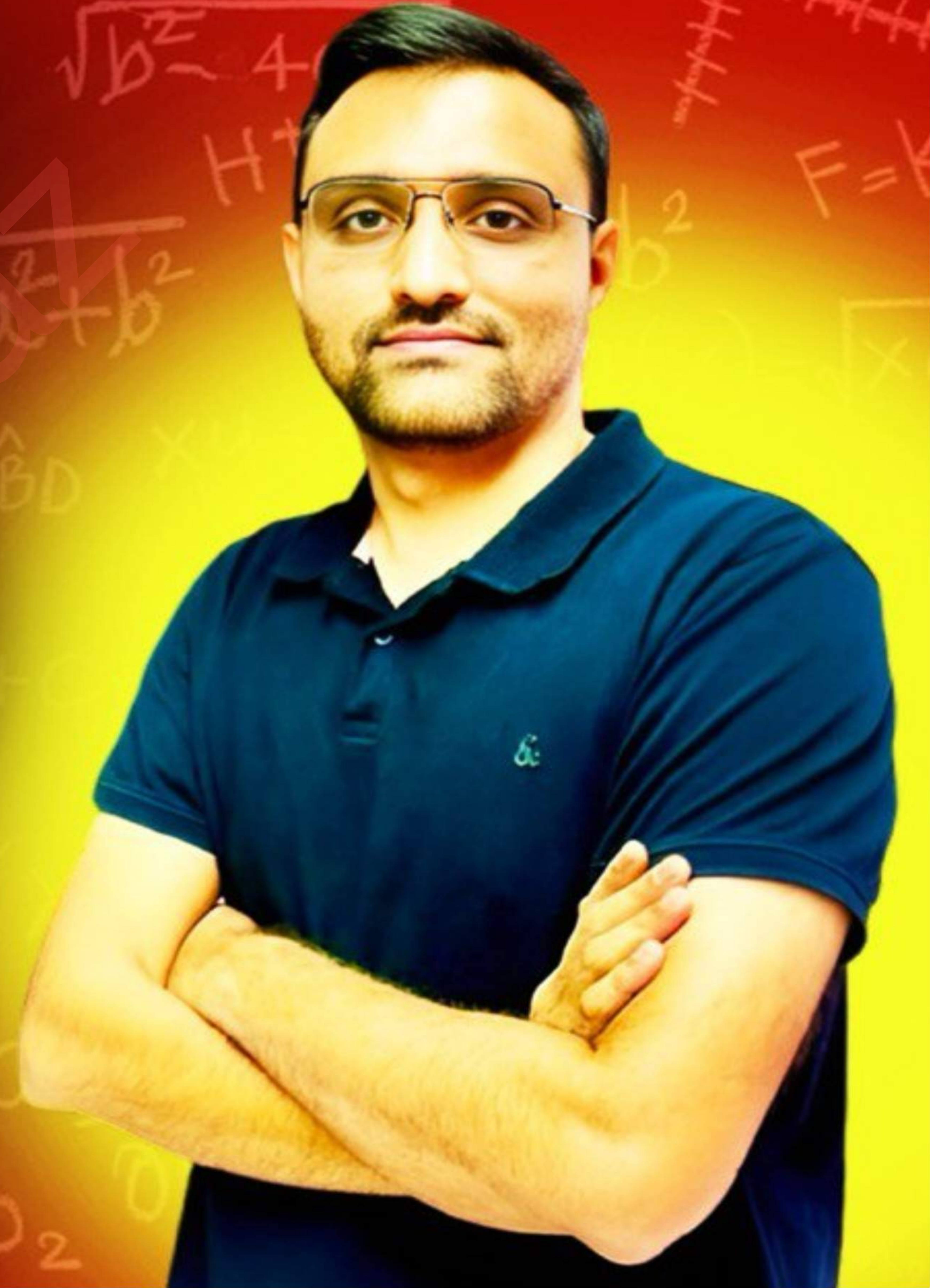


DDCET 2025

अब की बार - 180 पार

MATHS

DEFINITE INTEGRATION



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$$\int_a^b f(x) dx = \left[F(x) \right]_a^b$$

$$\int_a^a f(x) dx = 0$$

$$\int_a^b f(x) dx = - \int_b^a f(x) dx$$

Jagrit Awaaz

1



$$\int_0^{\frac{\pi}{2}} \cos x \cdot e^{\sin x} dx = \dots\dots\dots$$

(A) $e + 1$

(B) $e - 1$

(C) e

(D) $-e$

$$\sin x = t$$

$$\cos x dx = dt$$

$$\int_0^1 e^t dt = (e^t)'_0^1 = e - e^0 = e - 1$$



2

Good

$$\int_a^b \frac{\log x}{x} dx = \dots\dots\dots \text{(where } a, b \in \mathbb{R}^+)$$

(A) $\frac{1}{2} \log ab$

(B) $\log \left(\frac{b}{a} \right)$

(C) $2 \log \left(\frac{b}{a} \right)$

(D) $\frac{1}{2} \log(ab) \log \left(\frac{b}{a} \right)$

$$\begin{aligned} \int_a^b (\log x)^1 \cdot \frac{1}{x} dx &= \left[\frac{(\log x)^2}{2} \right]_a^b \\ &= \frac{1}{2} \left[(\log b)^2 - (\log a)^2 \right] \\ &= \frac{1}{2} \left[\underbrace{(\log b)^2}_{x^2} - \underbrace{(\log a)^2}_{y^2} \right] \\ &= (x+y)(x-y) \end{aligned}$$
$$\begin{aligned} &= \frac{1}{2} (\log b + \log a) \cdot (\log b - \log a) \\ &= \frac{1}{2} \log ab \cdot \log \frac{b}{a} \end{aligned}$$



3

$$\sin\left(\frac{\pi}{2}-x\right)$$

$$I = \int_0^{\frac{\pi}{2}} \frac{2^{\sin x}}{2^{\sin x} + 2^{\cos x}} dx = \dots \quad \text{--- (1)}$$

$x \rightarrow \frac{\pi}{2} - x$

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) π (D) 2π

$$I = \int_0^{\frac{\pi}{2}} \frac{2^{\cos x}}{2^{\cos x} + 2^{\sin x}} dx \quad \text{--- (2)}$$

(1) + (2)

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

$$2I = \int_0^{\frac{\pi}{2}} 1 dx$$

$$2I = (x)_0^{\frac{\pi}{2}}$$

$$2I = \frac{\pi}{2} - 0$$

$$I = \frac{\pi}{4}$$



5 $\int_{-e}^e + (x)^5$

$$I = \int_{-e}^e \log \left(\frac{e^5 - x^5}{e^5 + x^5} \right) dx = \dots \text{--- (1)}$$

(A) e

$x \rightarrow -x$

(B) 5

$$I = \int_{-e}^e \log \left(\frac{e^5 + x^5}{e^5 - x^5} \right) dx \text{--- (2)}$$

$$2I = \int_{-e}^e \left\{ \log \left(\frac{e^5 - x^5}{e^5 + x^5} \right) + \log \left(\frac{e^5 + x^5}{e^5 - x^5} \right) \right\} dx \quad \text{(C) } 0 \quad \text{(D) } -e$$

$$2I = \int_{-e}^e \log(1) dx$$

$$2I = 0$$

$$I = 0$$



6

$$\frac{\pi}{8} + \frac{3\pi}{8} = \frac{4\pi}{8} = \frac{\pi}{2}$$

$$\int_{\pi/8}^{3\pi/8} \frac{1}{1 + \sqrt{\tan x}} dx = \dots\dots\dots$$

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{8}$

(C) $\frac{\pi}{2}$

(D) 0

$$I = \frac{\frac{3\pi}{8} - \frac{\pi}{8}}{2} = \frac{\frac{2\pi}{8}}{2} = \frac{\pi}{8}$$



7

$$0 + 4028 - x \quad 4028 - (4028 - x)$$

$$I = \int_0^{4028} \frac{f(x)}{f(x) + f(4028 - x)} dx = \dots \quad \text{--- (1)}$$

(A) 4028

(B) 0

(C) 2014

(D) 8056

$$I = \int_0^{4028} \frac{f(4028 - x)}{f(4028 - x) + f(x)} dx \quad \text{--- (2)}$$

$$2I = \int_0^{4028} \frac{f(x) + f(4028 - x)}{f(x) + f(4028 - x)} dx$$

$$2I = \int_0^{4028} 1 dx$$

$$2I = (x)_0^{4028}$$

$$2I = 4028 - 0$$

$$I = 2014$$

8

$$\int_4^9 \frac{dx}{x - \sqrt{x}} = \dots\dots\dots$$

(A) $\log 2$ (B) $\log 4$ (C) $\log 3$ (D) $-\log 2$

$$\int_4^9 \frac{1}{\sqrt{x}\sqrt{x} - \sqrt{x}} dx$$

$$= \int_4^9 \frac{1}{\sqrt{x}(\sqrt{x}-1)} dx$$

$$= 2 \int_4^9 \frac{\frac{1}{2\sqrt{x}}}{\sqrt{x}-1} dx$$

$$= 2 \left[\log |\sqrt{x}-1| \right]_4^9$$

$$\sqrt{x} = t$$

$$x = t^2$$

$$1. dx = 2t dt$$

$$\int_2^3 \frac{2t}{t^2 - t} dt$$

$$\int_2^3 \frac{2\cancel{t}}{\cancel{t}(t-1)} dt$$

$$2 \int_2^3 \frac{1}{t-1} dt$$

$$= 2 \left[\log(t-1) \right]_2^3$$

$$= 2 \left[\log 2 - 0 \right]$$

$$= 2 \log 2$$

$$= \log 4$$





9

$$\int_{-1}^{\sqrt{3}} \frac{dx}{1+x^2} = \dots\dots\dots$$

(A) $\frac{7\pi}{12}$

(B) $\frac{\pi}{6}$

(C) $\frac{\pi}{12}$

(D) $\frac{5\pi}{12}$

$$\begin{aligned} \left[\frac{1}{1} \tan^{-1} \frac{x}{1} \right]_{-1}^{\sqrt{3}} &= \tan^{-1}(\sqrt{3}) - \tan^{-1}(1) \\ &= \tan^{-1}\left(\tan \frac{\pi}{3}\right) + \tan^{-1}\left(\tan \frac{\pi}{4}\right) \\ &= \frac{\pi}{3} + \frac{\pi}{4} \\ &= \frac{7\pi}{12} \end{aligned}$$

$$\begin{aligned} \sin^{-1}(-x) & \\ \tan^{-1}(-x) &= -\tan^{-1}x \\ \operatorname{cosec}^{-1}(-x) & \\ \cos^{-1}(-x) &= \pi - \cos^{-1}x \end{aligned}$$

10



$$I = \int_0^{\pi} \cos^3 x \cdot \sin^4 x \, dx = \dots \dots \dots \textcircled{1}$$

(A) $-\pi$ $x \rightarrow \pi - x$

(B) 0

(C) π (D) 2π

$$I = \int_0^{\pi} \cos^3(\pi - x) \sin^4(\pi - x) \, dx$$

$$I = \int_0^{\pi} -\cos^3 x \sin^4 x \, dx \textcircled{2}$$

$$2I = 0$$

$$I = 0$$





11

$$I = \int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \sin^5 x \cos^2 x \, dx = \dots\dots\dots .$$

(A) $\frac{1}{\sqrt{2}} - 1$ $x \rightarrow -x$

(B) 0

(C) $\left(\frac{\pi}{6}\right)^5 - \left(\frac{\pi}{6}\right)^2$

(D) $\left(\frac{\pi}{6}\right)^2 - \left(\frac{\pi}{6}\right)^5$

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$$\sin^2 x = \frac{1 - \cos 2x}{2}$$

$$2 \times \frac{\pi}{4} = \frac{\pi}{2}$$

$$\int_{-\pi/4}^{\pi/4} \sin^2 x \, dx = \dots$$

(A) 0

(B) $\frac{1}{2} - \frac{\pi}{4}$ (C) $\frac{\pi}{4} - \frac{1}{2}$ (D) $\frac{\pi}{4} + \frac{1}{2}$

$$\int_{-\pi/4}^{\pi/4} \frac{1 - \cos 2x}{2} \, dx = \frac{1}{2} \left[x - \frac{\sin 2x}{2} \right]_{-\pi/4}^{\pi/4}$$

$$= \frac{1}{2} \left\{ \left[\frac{\pi}{4} - \frac{\sin \frac{\pi}{2}}{2} \right] - \left[-\frac{\pi}{4} + \frac{\sin(+\frac{\pi}{2})}{2} \right] \right\}$$

$$= \frac{1}{2} \left[\frac{\pi}{4} - \frac{1}{2} \right]$$

$$= \frac{\pi}{4} - \frac{1}{2}$$

$$= \frac{1}{2} \left[\left(\frac{\pi}{4} - \frac{1}{2} \right) + \left(\frac{\pi}{4} - \frac{1}{2} \right) \right]$$



13

$$\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\cot x}} = \dots$$

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{3}$

(C) $\frac{\pi}{12}$

(D) $\frac{\pi}{2}$

$$I = \frac{b-a}{2} = \frac{\frac{\pi}{3} - \frac{\pi}{6}}{2} = \frac{\pi}{12}$$

14

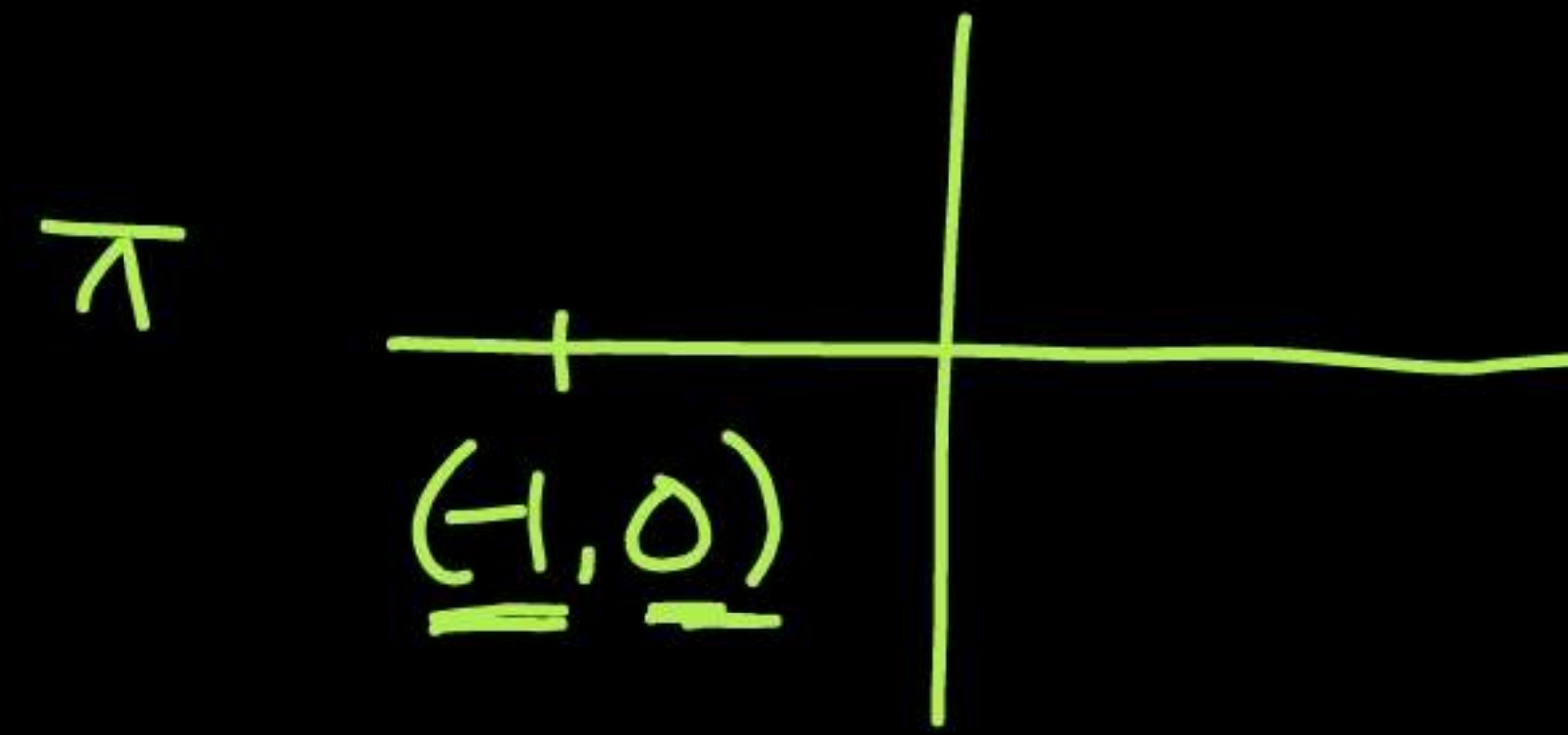
$$\int_0^{\pi} \sin x \, dx = \dots\dots\dots$$

(A) 0

(B) 2

(C) 1

(D) -2



$$\begin{aligned} [-\cos x]_0^{\pi} &= (-\cos \pi) - (-\cos 0) \\ &= -(-1) - (-1) \\ &= 1 + 1 \\ &= 2 \end{aligned}$$





The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x^3 - \cos x + \tan^5 x) dx$ is

(A) π

(B) -2

(C) 0

(D) 1

$$I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (-x^3 - \cos x - \tan^5 x) dx \quad \text{--- (2)}$$

$$\text{(1) + (2)} \quad \cancel{I} = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (-\cancel{I} \cos x) dx$$

$$I = -(\sin x) \Big|_{-\frac{\pi}{2}}^{\frac{\pi}{2}} = -(1 - (-1)) = -2$$

16

$$I = \int_{-1}^1 \sin^5 x \cos^4 x \, dx = \dots\dots\dots$$

(A) -2

 $x \rightarrow -x$

(B) 2

(C) 0

(D) 3



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The value of $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ is

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{4}$

(C) 0

(D) $\frac{\pi}{12}$

$$I = \frac{b-a}{2} = \frac{\pi}{12}$$



$$\int_2^3 \frac{x}{x^2+1} dx = \dots$$

(A) $\log(x^2 + 1)$

(B) $\frac{1}{2} \log(2)$

(C) $\frac{1}{2} \log(5)$

(D) $\frac{1}{2} \log\left(\frac{3}{2}\right)$

$$\frac{1}{2} \int_2^3 \frac{2x}{(x^2+1)^1} dx$$

$$\frac{1}{2} \left[\log|x^2+1| \right]_2^3 = \frac{1}{2} (\log 10 - \log 5)$$

$$= \frac{1}{2} \left(\log \frac{10}{5} \right)$$

$$= \frac{1}{2} \log 2$$

$$\int \frac{1}{x\sqrt{x^2-a^2}} dx = \frac{1}{a} \sec^{-1} \frac{x}{a}$$

$$\int_{\sqrt{2}}^k \frac{1}{x\sqrt{x^2-1}} dx = \frac{\pi}{2}, \text{ then } k = \dots$$

(A) 2

(B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$

(D) 0

$$\left(\frac{1}{1} \sec^{-1} \frac{x}{1} \right)_{\sqrt{2}}^k = \frac{\pi}{2}$$

$$\sec^{-1} k - \sec^{-1} \sqrt{2} = \frac{\pi}{2}$$

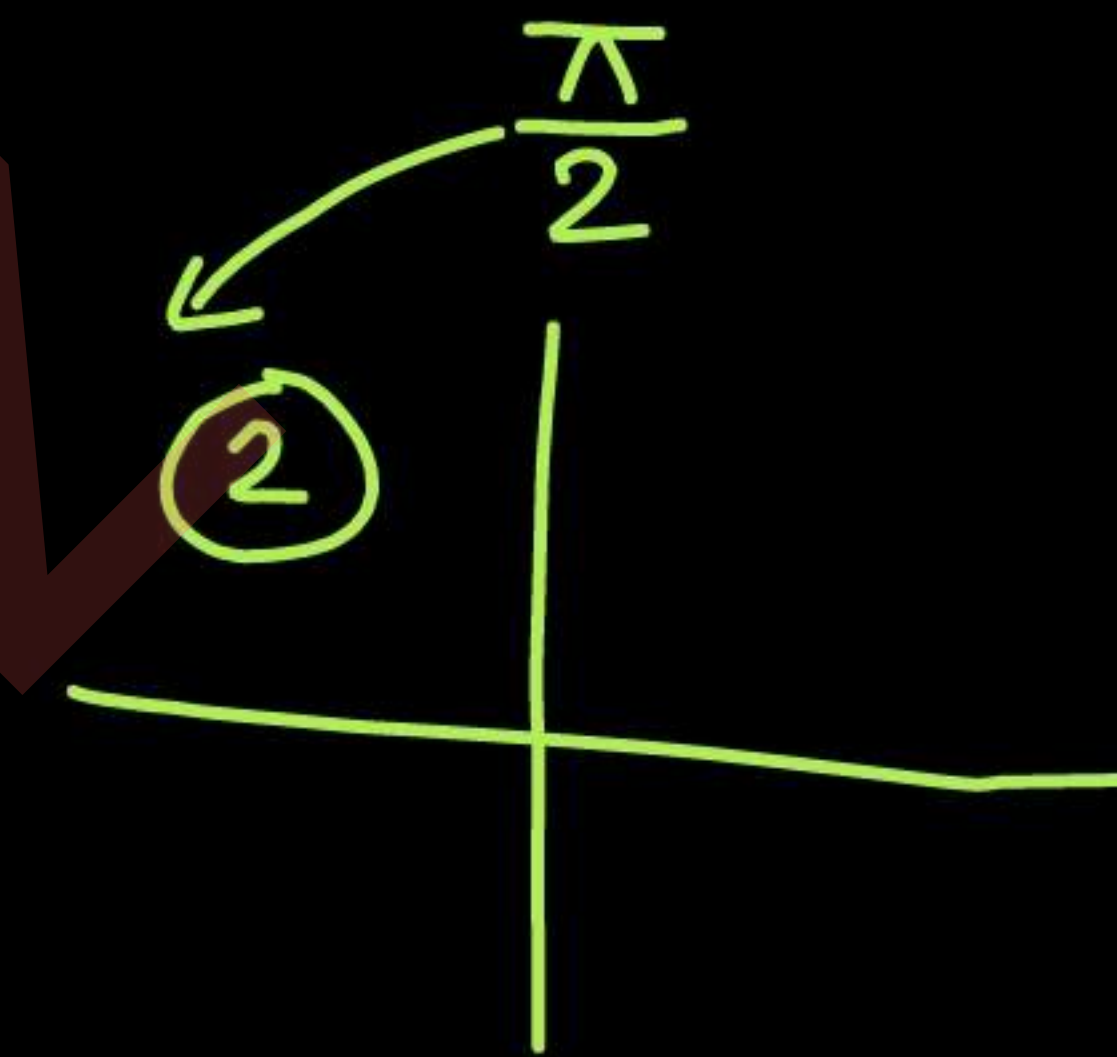
$$\sec^{-1} k - \sec^{-1} (\sec \frac{\pi}{4}) = \frac{\pi}{2}$$

$$\sec^{-1} k = \frac{\pi}{2} + \frac{\pi}{4}$$

$$k = \sec \left(\frac{\pi}{2} + \frac{\pi}{4} \right) = -\operatorname{cosec} \frac{\pi}{4} = -\sqrt{2}$$

$$\sin \theta = \frac{4}{5}$$

$$\theta = \sin^{-1} \frac{4}{5}$$





22

H.W

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x^3 + x \cos x + \tan^5 x + 1) dx = \dots\dots\dots$$

$x \rightarrow -x$

(A) π

(B) 1

(C) 0

(D) 2

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$0+1-x$

$$I = \int_0^1 x(1-x)^4 dx = \dots\dots\dots$$

(A) 0 $x \rightarrow 1-x$

(B) $\frac{1}{45}$

(C) $\frac{1}{30}$

(D) $\frac{1}{15}$

$$I = \int_0^1 (1-x)(1-(1-x))^4 dx$$

$$I = \int_0^1 (1-x)x^4 dx = \int_0^1 (x^4 - x^5) dx = \left(\frac{x^5}{5} - \frac{x^6}{6} \right) \Big|_0^1 = \left(\frac{1}{5} - \frac{1}{6} \right) - (0-0) = \frac{1}{30}$$



$$\frac{1}{1 + \tan^n x}$$

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1 + \sqrt{\tan x}} dx = \dots\dots$$

(A) $\frac{\pi}{3}$

(B) $\frac{\pi}{6}$

(C) $\frac{\pi}{12}$

(D) $\frac{\pi}{2}$

$$I = \frac{b-a}{2} = \frac{\frac{\pi}{3} - \frac{\pi}{6}}{2} = \frac{\frac{\pi}{6}}{2} = \frac{\pi}{12}$$





$$\int_1^e \log x \, dx = \dots\dots\dots$$

(A) 1

(B) $e + 1$ (C) $e - 1$

(D) 0

$$\begin{aligned} [x \log x - x]_1^e &= (e \log e - e) - (0 - 1) \\ &= e(1) - e + 1 \\ &= 1 \end{aligned}$$



$$I = \int_{-1}^1 \sin^7 x \cdot \cos^6 x \, dx \quad \text{--- (1)}$$

(A) 2

 $x \rightarrow -x$

(B) -1

(C) 0

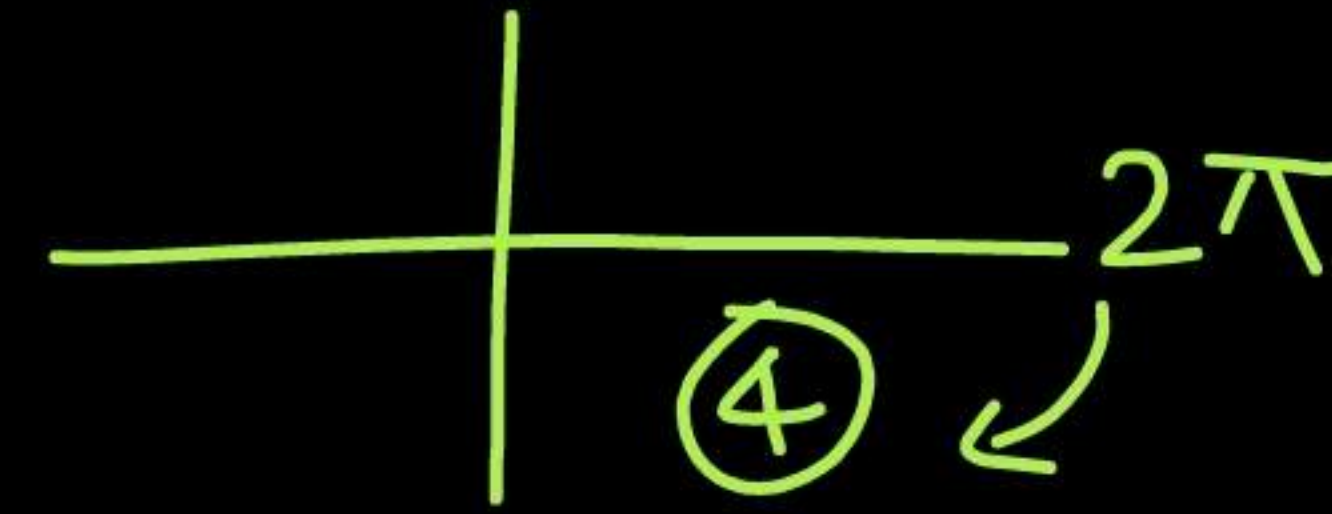
(D) 1

$$I = \int_{-1}^1 \sin^7(-x) \cos^6(-x) \, dx$$

$$I = \int_{-1}^1 -\sin^7 x \cos^6 x \, dx \quad \text{--- (2)}$$

$$2I = 0$$

$$I = 0$$



$$I = \int_0^{2\pi} \sin^3 x \cos^2 x \, dx = \dots \quad \text{--- (1)}$$

(A) -1

 $x \rightarrow 2\pi - x$ (B) 2π

(C) 1

(D) 0

$$I = \int_0^{2\pi} \sin^3(2\pi - x) \cos^2(2\pi - x) \, dx$$

$$I = \int_0^{2\pi} -\sin^3 x \cos^2 x \, dx \quad \text{--- (2)}$$

(1) + (2)

$$2I = 0$$

$$I = 0$$



$$I = \int_{-\pi/2}^{\pi/2} (x^{13} + x \cos x + \tan^{15} x + 1) dx \quad \text{--- (1)}$$

(A) 0

 $x \rightarrow -x$

(B) 2

(C) π

(D) 1

$$I = \int_{-\pi/2}^{\pi/2} ((-x^{13}) - x \cos x - \tan^{15} x + 1) dx \quad \text{--- (2)}$$

① + ②

$$2I = \int_{-\pi/2}^{\pi/2} 1 dx \quad \Bigg| \quad I = (x) \Big|_{-\pi/2}^{\pi/2}$$

$$I = \frac{\pi}{2} - \left(-\frac{\pi}{2}\right) = \pi$$



41

$$I = \int_{\pi/6}^{\pi/3} \frac{1}{1 + \tan^4 x} dx = \dots\dots$$

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{12}$

(C) $\frac{\pi}{4}$

(D) $\frac{\pi}{6}$

$$I = \frac{b-a}{2} = \frac{\frac{\pi}{3} - \frac{\pi}{6}}{2} = \frac{\frac{\pi}{6}}{2} = \frac{\pi}{12}$$



42

$$x \rightarrow \frac{L+U+P}{2} - x$$

$$I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x^5 - x^3 \cos x + \sin^3 x - 3) dx = \dots \quad \text{--- (1)}$$

(A) $-\pi$ (B) 3π (C) -3π (D) 0

$$I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left((-x)^5 - (-x)^3 \cos(-x) + \sin^3(-x) - 3 \right) dx$$

$$I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(-x^5 + x^3 \cos x - \sin^3 x - 3 \right) dx \quad \text{--- (2)}$$

$$\text{(1)} + \text{(2)}$$
$$2I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (-6) dx$$

$$2I = (-6) \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} 1 dx$$

$$I = -3 \left(x \right)_{-\frac{\pi}{2}}^{\frac{\pi}{2}}$$

$$I = -3 \left(\frac{\pi}{2} - \left(-\frac{\pi}{2} \right) \right)$$

$$I = -3 \left(\frac{\pi}{2} + \frac{\pi}{2} \right)$$

$$I = -3\pi$$



43

ILATE
↓ ↓

$$\int u v dx = u \int v dx - \int \left(\frac{du}{dx} \cdot \int v dx \right) dx$$

$$\int_0^1 \underbrace{x}_u \underbrace{e^x}_v dx = \dots\dots$$

(A) 0

(B) 1

(C) e

(D) -1

$$x e^x - \int 1 \cdot e^x dx$$

$$\left[x e^x - e^x \right]_0^1 = (e - e) - (0 - 1)$$

$$= 1$$

$$\int \frac{1}{x^2+a^2} dx = \frac{1}{a} \tan^{-1} \frac{x}{a} + c$$



$$\int_1^{\sqrt{3}} \frac{1}{1+x^2} dx = \dots\dots\dots$$

(A) $\frac{\pi}{3}$

(B) $\frac{2\pi}{3}$

(C) $\frac{\pi}{6}$

(D) $\frac{\pi}{12}$

$$\begin{aligned} \left(\frac{1}{1} \tan^{-1} \frac{x}{1} \right)_1^{\sqrt{3}} &= \tan^{-1} \sqrt{3} - \tan^{-1}(1) \\ &= \tan^{-1} \left(\tan \frac{\pi}{3} \right) - \tan^{-1} \left(\tan \frac{\pi}{4} \right) \\ &= \frac{\pi}{3} - \frac{\pi}{4} \\ &= \frac{4\pi - 3\pi}{12} = \frac{\pi}{12} \end{aligned}$$

* King Rule: (Definite Int)

① $\log(\text{Trigo})$

② $-a$ to a

③ Question $\boxed{L.L + U.P - x}$ $\bar{E}z\eta\eta\lambda$.

④ $\sin^m x \cos^n x, \sin^n x, \cos^n x$

⑤ $\int_a^b \frac{\sin^n x}{\sin^n x + \cos^n x} \cdot \int_a^b \frac{\tan^n x}{\tan^n x + \cot^n x} \cdot \int_a^b \frac{1}{1 + \tan^n x} \cdot \int_a^b \frac{\sec^n x}{\sec^n x + \operatorname{cosec}^n x} \rightarrow I = \frac{b-a}{2}$

$\boxed{a+b = \frac{\pi}{2}}$