YAKEEN NEET 2.0

2026

Trigonometry →
Differentiation →
Integration →
Graph →
full PhD.

Basic Maths and Calculus (Mathematical Tools)

Physics | Lecture - 15
last lecture

By- Manish Raj (MR Sir)

Topics to be covered

1. H/W of last Lecture
2. PhD. on integration
3. Binominal approx^m
4.

Question

$L_1 = 16\,dB$

Loudness at a point is 16 dB where intensity is I then find loudness at a point where Intensity is $I/4$.

$L_2 = ??$

where

$$\boxed{L = 10\log_{10}\left(\frac{I}{I_0}\right)\text{dB}}$$

(given in question)

Sol^n for 1st case.

$$16\,dB = 10\log_{10}\left(\frac{I}{I_0}\right)dB$$

$$16\,dB = 10\log_{10}\left(\frac{I}{I_0}\right)dB \quad (1)$$

2nd case

$$L = 10\log_{10}\left(\frac{I}{4I_0}\right)dB \quad - (2)$$

$\boxed{(1)-(2)}$

$$16\,dB - L\,dB = 10\log_{10}\left(\frac{I}{I_0}\right) - 10\log_{10}\left(\frac{I}{4I_0}\right)$$

$$16 - L = 10\left[\log_{10}\frac{\cancel{I}/\cancel{I_0}}{\cancel{I}/4\cancel{I_0}}\right] = 10\log_{10}4 = 20\log_{10}2 = 20\times 0.3 = 2\cancel{0}\times\frac{3}{\cancel{10}} = 6$$

$$\boxed{16-6=L} *$$

Question

$L_1 = 16\,dB$

Loudness at a point is 16 dB where intensity is I then find loudness at a point where Intensity is $I/4$.

$L_2 = ??$

where $L = 10\log_{10}\left(\frac{I}{I_0}\right)$ dB

(given in question)

Sol^n

case-1

$$16 = 10\log_{10}\left(\frac{I}{I_0}\right) dB \quad -(1)$$

case-2

$$L = 10\log_{10}\left(\frac{I}{4I_0}\right) dB \quad -(11)$$

(1) − (11)

$$16 - L = 10\left[\log_{10}\left(\frac{I}{I_0}\right) - \log_{10}\left(\frac{I}{4I_0}\right)\right] dB$$

$$16 - L = 10\left[\log_{10}\frac{\frac{I}{I_0}}{\frac{I}{4I_0}}\right]$$

$$16 - L = 10\log_{10}4$$

$$= 10\log_{10}(2)^2$$

$$= 20\log_{10}2$$

$$= 20 \times 0.3$$

$$16 - L = 6$$

$L = 16 - 6$

$\boxed{L = 10\,dB}$

Ans

\# $$\boxed{\int x^n\,dx = \frac{x^{n+1}}{n+1} + C}$$

but not valid for $n=-1$

\# $$\int x^{-1}\,dx = \int \frac{1}{x}\,dx = \log_e x = \ln x$$

$$\boxed{\begin{aligned}
&\#\ \int e^x\,dx = e^x + C\\
&\#\ \int \sin x\,dx = -\cos x + C\\
&\#\ \int \cos x\,dx = \sin x + c
\end{aligned}}$$

\# $y = 5\cos x$

$$\int 5\cos x\,dx = 5\int \cos x\,dx = 5\sin x$$

\# $$\int (x^3 + 2x^4 + e^x - \sin x)\,dx$$

$$= \frac{x^{3+1}}{3+1} + 2\frac{x^{4+1}}{4+1} + e^x - (-\cos x)$$

$$= \frac{x^4}{4} + \frac{2x^5}{5} + e^x + \cos x$$

\# $\int dx = x$

$\int d(A) = A$

$\int d(\text{Ramlal}) = \text{Ramlal}$

$\int dE = E$

$\int d(xy) = xy$

Question

$$\int_0^{\pi/2} \sin\theta\, d\theta = -\left[\cos\theta\right]_0^{\pi/2}$$

$$= -\left[\cos\pi/2 - \cos 0^\circ\right]$$

$$= -\left[0 - 1\right]$$

$$= +1$$

$\theta_f = \pi$, $\theta_i = 0$

$$\int_0^{\pi} \sin\theta\, d\theta = \left[-\cos\theta\right]_0^{\pi} = -\left[\cos\pi - \cos 0\right]$$

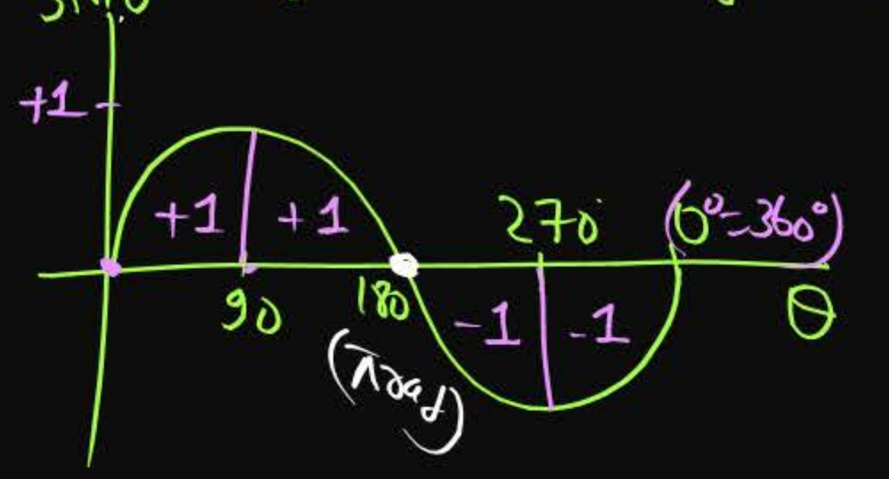
$$= -\left[-1 - 1\right]$$

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

$$= +2$$

MR* Box

Integration = Area under curve of y/x graph



Question

$$\int_0^{\pi\,rad} \cos\theta \, d\theta = \left(\sin\theta\right)_{0^\circ}^{\pi\,rad}$$

$$= \sin\pi - \sin 0$$

$$= 0 - 0$$

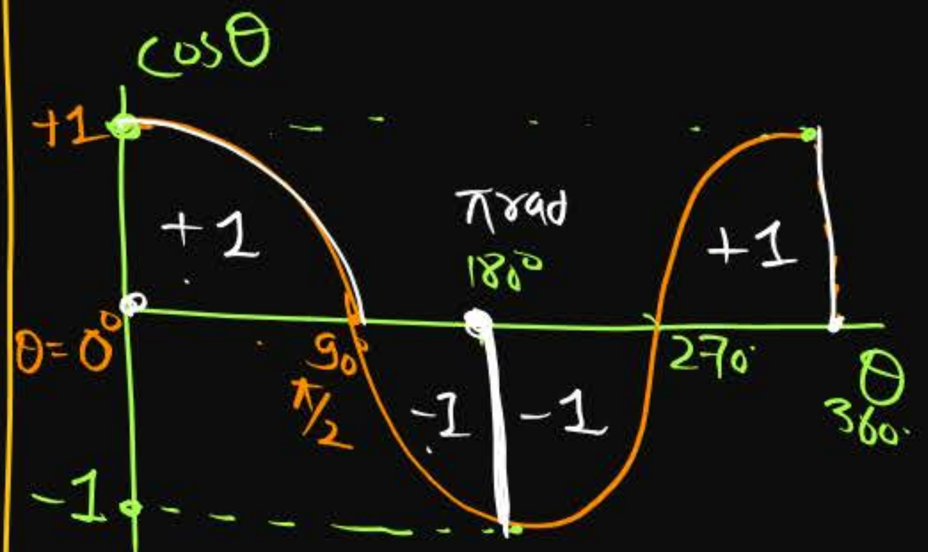
$$= 0$$

$$\int_\pi^{2\pi} \cos\theta \, d\theta = \left(\sin\theta\right)_{\pi}^{2\pi} = \sin(2\pi) - \sin\pi$$

$$= 0 - 0$$

$$= 0$$

MR* BOX



Sivani Yadav ✓

$$\boxed{\sin(\pi) = \sin(180^\circ) = 1}$$

हमारा लगा है ||

$$\sin\pi = 0$$

Question

$$\int_0^1 e^x dx = \left[e^x\right]_0^1$$

$$= e^1 - e^0$$

$$= \underbrace{(e-1)}$$

$$= 2.71 - 1$$

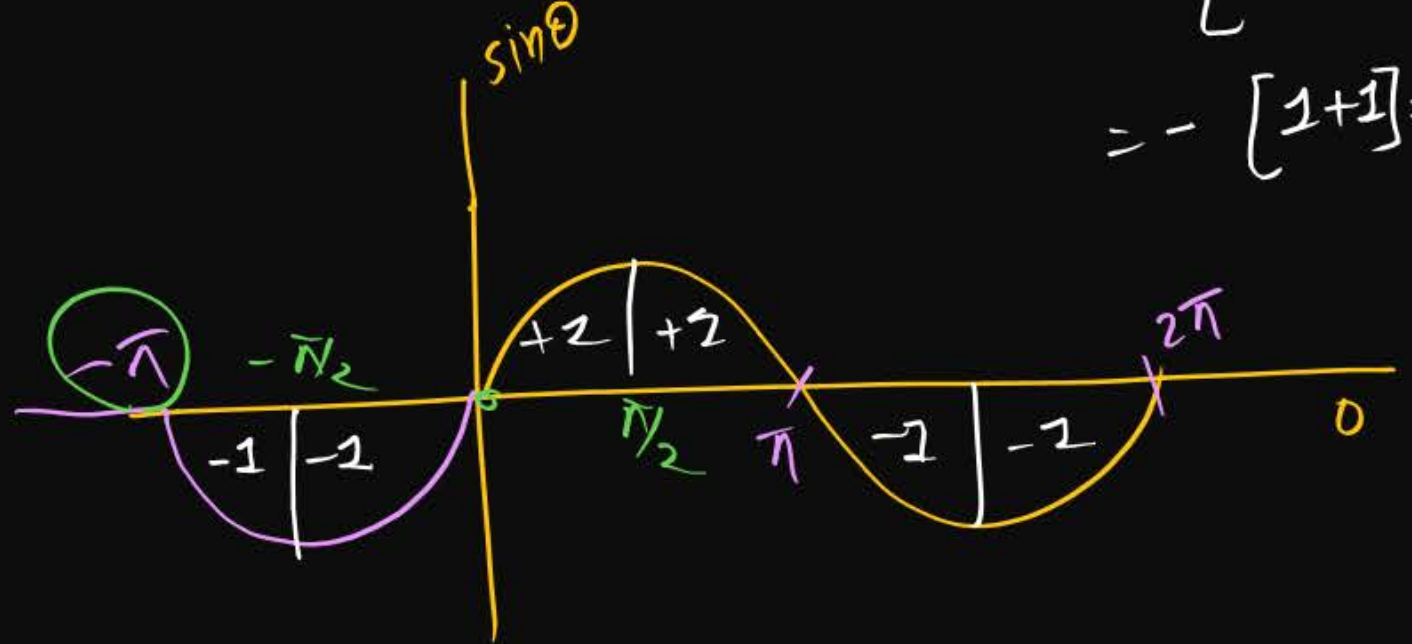
$$= \underbrace{1.71}$$ Ans

* $\boxed{\cos(\pi) = \cos(-\pi) = -1}$

$$\int_{-\pi}^{2\pi} \sin\theta d\theta = -2 = -\left[\cos\theta\right]_{-\pi}^{2\pi} = -\left[\cos 2\pi - \cos(-\pi)\right]$$

$$= -\left[1 - (-1)\right]$$

$$= -\left[1+1\right] = \underline{\underline{-2}}$$

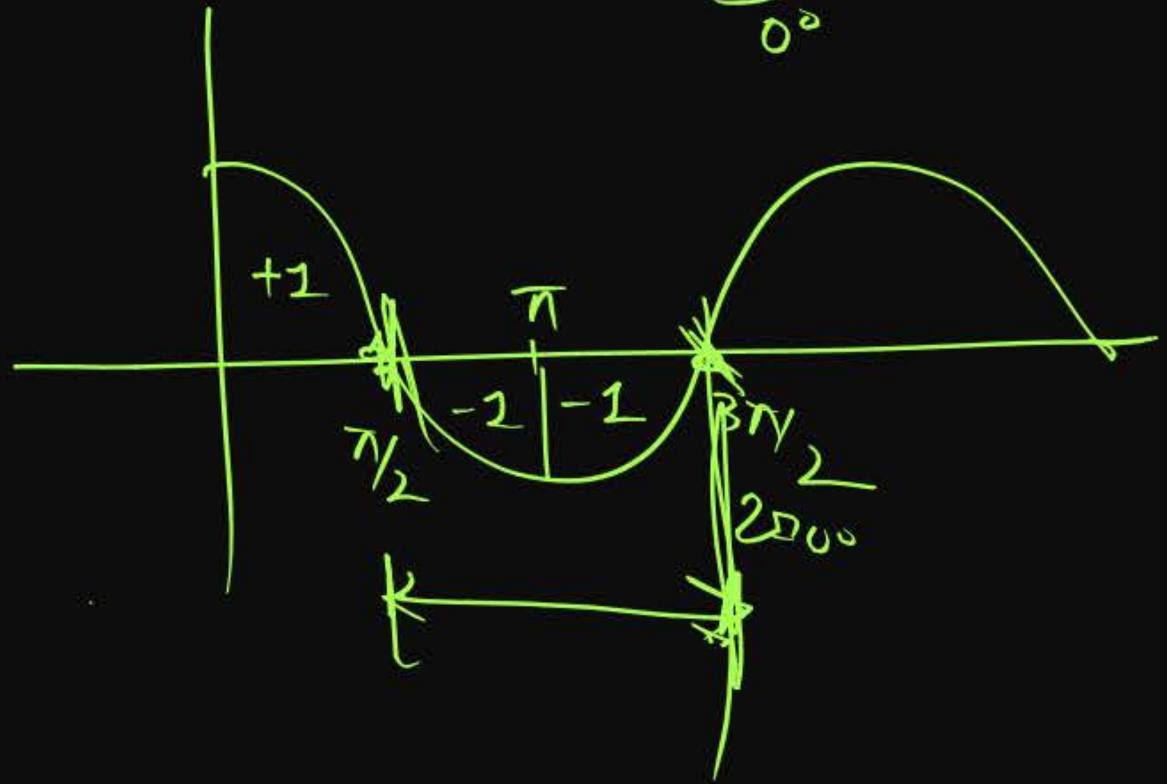


$$\boxed{\cos(-\theta) = \cos\theta}$$

Question

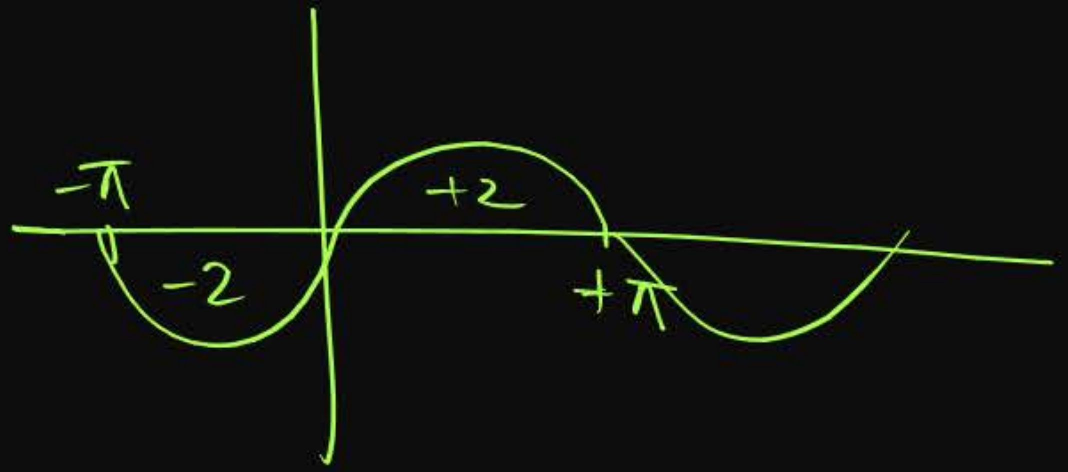
$$\int_{\pi/2 = 90^\circ}^{3\pi/2 = 270^\circ} \cos\theta \, d\theta = -2$$

$$\int_{0^\circ}^{270^\circ (3\pi/2)} \cos\theta \, d\theta = -1$$



Question

$$\int_{-\pi}^{+\pi} \sin\theta \, d\theta = 0$$

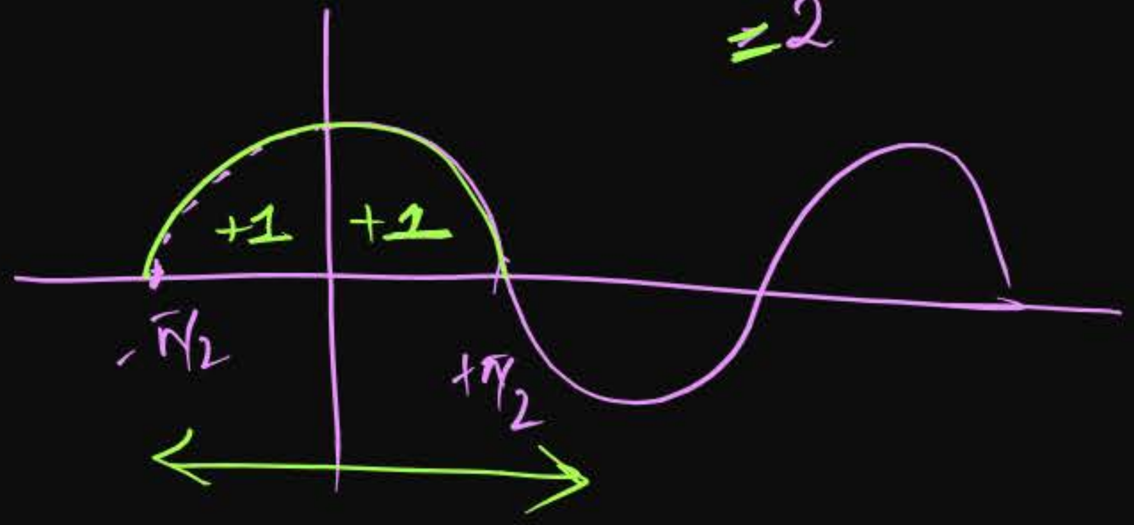


$$\int_{-\pi/2}^{+\pi/2} \cos\theta \, d\theta = \left(\sin\theta\right)_{-\pi/2}^{+\pi/2}$$

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

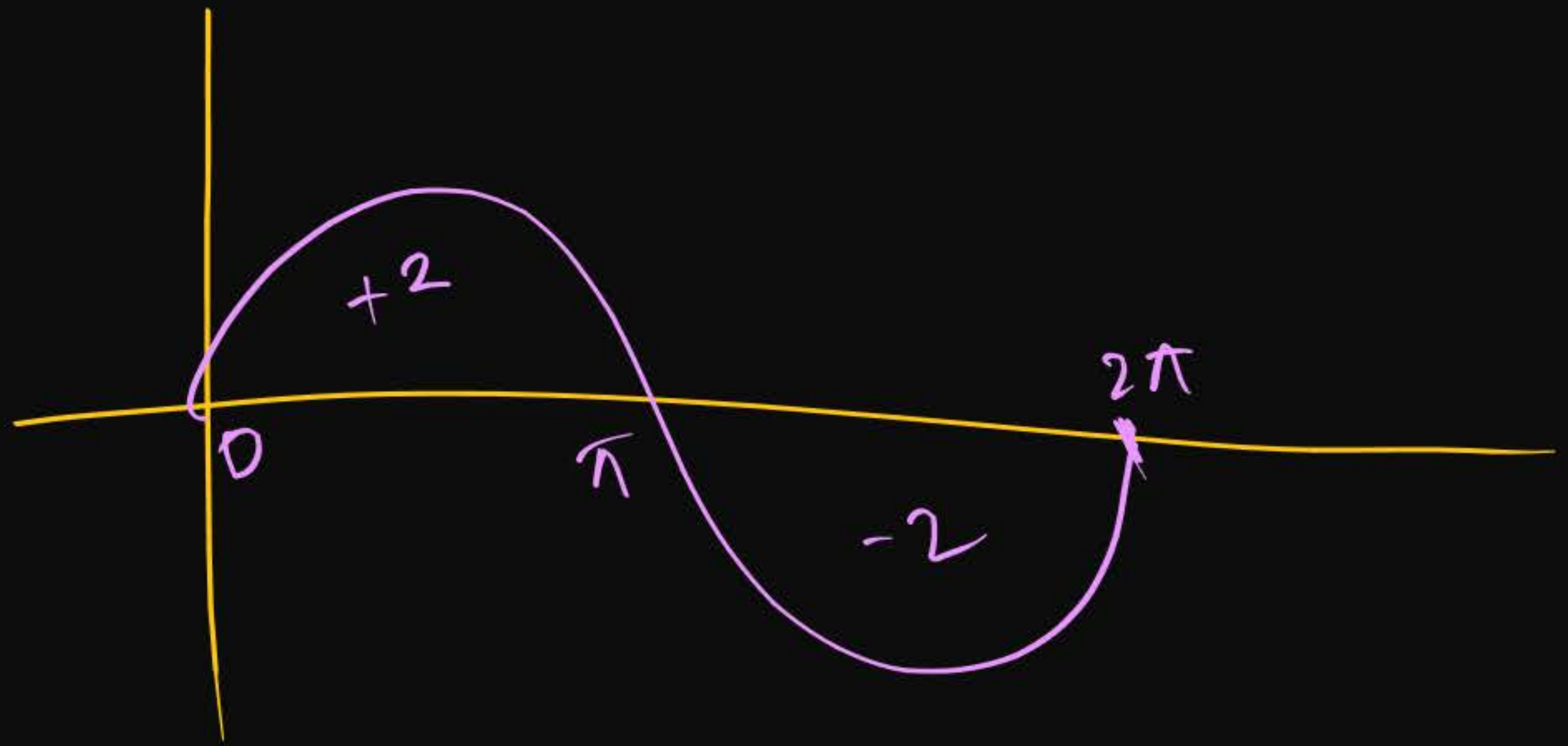
$$= 1 - (-1)$$

$$= 2$$



Question

$$\int_0^{2\pi} \sin\theta \, d\theta = 0$$



Question

$$\int_{-\pi/2}^{+\pi/2} \cos\theta \, d\theta = 2$$

Question

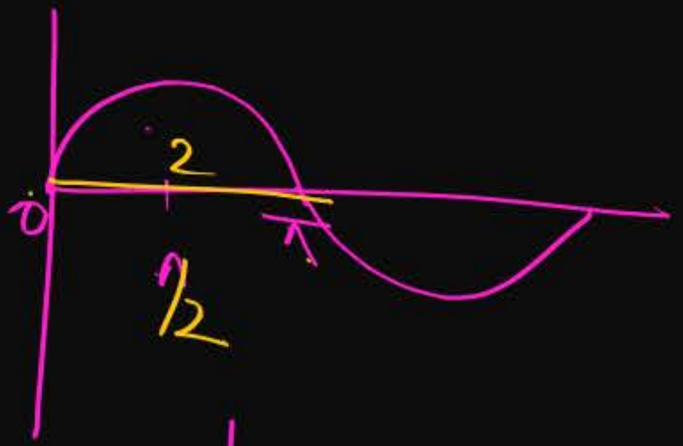
$$\int_0^{\pi/2} (\sin x + \cos x)\, dx = \int_0^{\pi/2} \sin x\, dx + \int_0^{\pi/2} \cos x\, dx = 1 + 1 = 2$$

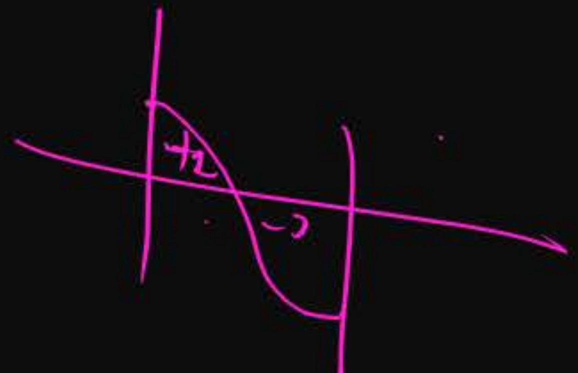
Question

$$\int_0^{\pi} (\sin x + \cos x)\, dx = \underbrace{\int_0^{\pi} \sin x \, dx}_{} + \underbrace{\int_0^{\pi} \cos x \, dx}_{}$$

$$= 2 + 0$$

$$= 2$$





Question

If $y = x^2 + 2$ then find integration from $x_1 = 1$ to $x_2 = 3$.

$$y = x^2 + 2$$

$$\int_{x_1=1}^{x_2=3} (x^2+2)\,dx = \int_1^3 x^2\,dx + \int_1^3 2\,dx$$

$$= \left(\frac{x^3}{3}\right)_1^3 + 2\left(x\right)_1^3$$

$$= \frac{1}{3}\left[3^3 - 1^3\right] + 2(3-1)$$

$$= \left(\frac{26}{3} + 4\right)$$

\# $\displaystyle\int_{r_i=\alpha}^{r_f=r_0} \frac{Kq_1q_2}{r^2}\,dr$ where K, q_1 & q_2 are cost^n.

$\boxed{-2+1=-1}$ $\boxed{\frac{1}{\alpha}=0}$

Sol^n $\displaystyle Kq_1q_2 \int_{\alpha}^{r_0} \frac{1}{r^2}\,dr$

$$= Kq_1q_2 \int_{\alpha}^{r_0} r^{-2}\,dr$$

$$= Kq_1q_2 \left(\frac{r^{-2+1}}{-2+1}\right)_{\alpha}^{r_0} = Kq_1q_2\left[\frac{r^{-1}}{-1}\right)_{\alpha}^{r_0} = -Kq_1q_2\left(\frac{1}{r}\right)_{\alpha}^{r_0} = -Kq_1q_2\left(\frac{1}{r_0}-\frac{1}{\alpha}\right]$$

$$= \frac{-Kq_1q_2}{r_0}$$ Ans

~~Chain Rule of Integration~~

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

$y = e^{(5x-3)}$

$y = (3x-8)^4$

outside - Inside

$$\int y\,dx = \left(\frac{\text{Integration of outer fu}^n\text{ Keep inside as it is}}{(\text{Coeffient of } x)}\right)$$

$$\boxed{\int \sin(2x+3)\,dx = \frac{-\cos(2x+3)}{2} + c}$$

$$\boxed{\int e^{(5x-3)}\,dx = \frac{e^{5x-3}}{5} + c}$$

#

$$\int x^4\,dx = \frac{x^{4+1}}{4+1} + C$$

$$= \frac{x^5}{5} + C$$

#

$$\int (3x-8)^4\,dx = \frac{(3x-8)^{4+1}}{(4+1)\times 3} + C$$

$$= \frac{(3x-8)^5}{5\times 3} + C$$

#

$$\int (ax+b)^4\,dx = \frac{(ax+b)^5}{5\times a} + c$$

- $\int \sin(4^\circ)\,dx = \sin 4 \int dx$

$$= \sin 4 \times x$$

$$\int \cos(b-ax)\,dx = \frac{\sin(b-ax)}{-a} + C$$

#

$$\int \frac{1}{(b-ax)^3}\,dx = \int (b-ax)^{-3}\,dx = \frac{(b-ax)^{-3+1}}{(-3+1)\times(-a)} = \frac{(b-ax)^{-2}}{-2\times -a} = \frac{(b-ax)^{-2}}{2a}$$

$$= \frac{1}{2a(b-ax)^2}$$

$$\int \frac{1}{(ax+b)}\,dx = \int (ax+b)^{-1}\,dx = \frac{\log_e(ax+b)}{a} + c$$

$$\boxed{\int \frac{1}{x}\,dx = \log_e x}$$

$$\int \frac{1}{(3x-4)}\,dx = \frac{\log(3x-4)}{3} + C$$

→ Kinematics में काम

Basic Maths and Calculus (Mathematical Tools) 14 : Integration || (NO DPP)

Comments Document Notes Doubt Timeline Rat

lecture-14

Deepti Choudhary · 42 minutes ago Report

hi sir Mera kisi reason se starting me hi backlog ho gya.. abhi esa hora h ki backlog pura karne k chakkar me pura din lecture hi dekhti reh jati hu na revision ho Para h na homework na assignment na DPP. kuch nhi kr pari lecture k aalawa backlog ki vajh se ..plz sir is chiz ko address kero or kl cl

7 likes

Sushmita Kumari · 44 minutes ago Report

nice class sir🥰

1 like

Agrim Dwivedi · 50 minutes ago Report

fastly

Question

$$\int_0^1 e^{-x}dx = \left(\frac{e^{-x}}{-1}\right)_0^1$$

$$= -1\left(e^{-1} - e^{-0}\right]$$

$$= -1\left(e^{-1} - 1\right)$$

$$= -\left(\frac{1}{e} - 1\right)$$

$$= 1 - \frac{1}{e}$$

$$= \frac{e-1}{e}$$ Ans

Question

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

$$= -\frac{1}{2}\left[\cos(2x)\right]_0^{\pi}$$

$$= -\frac{1}{2}\left[\cos(2\pi) - \cos 0\right]$$

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

$$= 0$$

Question

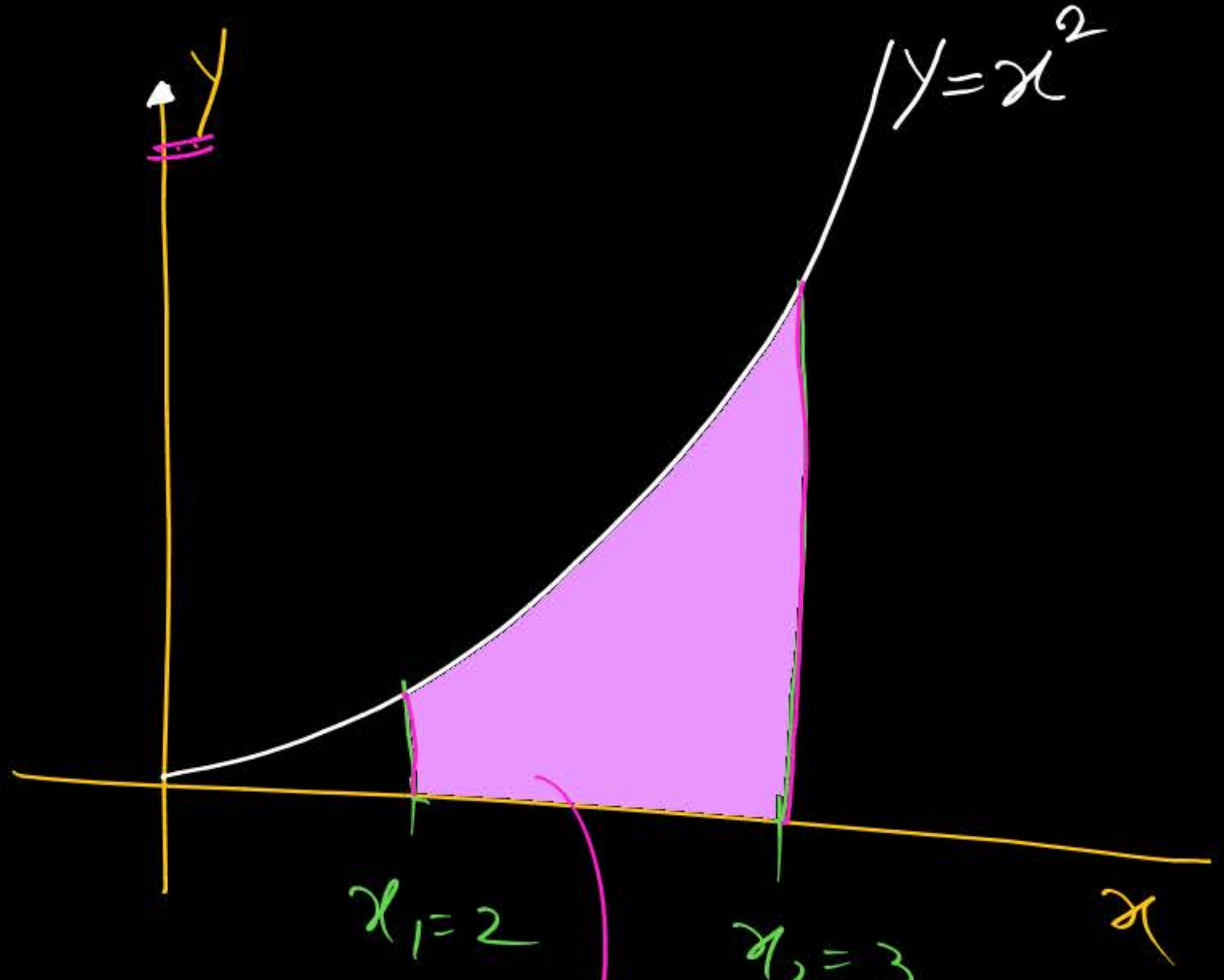
$$\int \left(\frac{x^3+2}{x^3}\right) dx =$$

$$\int \left(\frac{x^3}{x^3} + \frac{2}{x^3}\right) dx$$

$$\int \left(1 + \frac{2}{x^3}\right) dx$$

$$\int dx + 2\int \frac{1}{x^3} dx$$

Q



find Area under this graph from $x_1=2$ to $x_2=3$

$$\text{Area} = \int_{x_1=2}^{x_2=3} y\,dx = \int_{x_1=2}^{x_2=3} x^2\,dx = \left(\frac{x^3}{3}\right)_2^3 = \frac{1}{3}\left[3^3-2^3\right]$$

$$= \frac{1}{3}\left[27-8\right] = \frac{19}{3}$$

Average value (discrete value)

$$x_{Avg} = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$$ ✓

Average value continous system

$$\langle \square \rangle_{\text{time Avg}} = \frac{\int \square \, dt}{\int dt}$$

(Avg velocity)

$$\Rightarrow \langle \boxed{v} \rangle_{\text{time}} = \frac{\int v \, dt}{\int dt}$$

find Avg. value of current

$$\text{time Avg of current} = \langle I \rangle = \frac{\int I \, dt}{\int dt}$$

$$\boxed{\langle \boxed{\text{Ramlal}} \rangle = \frac{\int (\text{Ramlal}) \, dt}{\int dt}}$$

$$\left\langle S \cdot K \right\rangle_{\text{Avg.}} = \frac{\int (S \cdot K)\, dt}{\int dt}$$

Space - Avg. value

$$\langle \boxed{E} \rangle = \frac{\int E \cdot dr}{\int dr} = \frac{\int E\,dx}{\int dx} \quad \checkmark$$

space - Avg value of electric fied

feel

Question

Finding of average value of continuous variable.

$$\langle L \rangle_{\text{avg}} = \frac{\int L\, dt}{\int dt}$$

Value of length is discrete

$$L_{\text{avg}} = \frac{L_1 + L_2 + L_3 + L_4}{4}$$

$$L_{\text{avg}} = \frac{L_1 + L_2 + L_3 + \cdots + L_n}{n}$$

Question

H/w

If velocity of object V = 2t + 1 then find average velocity in 2 sec. (t_i = 0 to t_f = 2 sec)

$$V = 2t + 1$$

$$\langle V_{Avg} \rangle = \frac{\int v\,dt}{\int dt} = \frac{\int_0^2 (2t+1)\,dt}{\int_0^2 dt}$$

$$(1.0004)^6 = 1.0024$$

$$(1.08)^6 = 1.48$$

$$(1.07)^3 = 1.21$$

Binomial th.m

$$(1+x)^2 = 1^2 + 2\times 1x + x^2$$

$$(1+x)^2 = 1 + 2x + x^2$$

If $x <<<<< 1$

$x^2 \approx 0$

$$\boxed{(1+x)^2 = 1 + 2x}$$

$$(1-x)^2 = 1 - 2x$$

$x <<< 1$

$$\boxed{(a+b)^2 = a^2 + b^2 + 2ab}$$

MR*

$(\text{Carrier} + \text{Love})^2 = \text{Carrier} + 2\,\text{love}$

using Binomial thm

If love <<<< carrier

$$(1.006)^4 = (1+0.006)^4 = 1 + 4 \times (0.006) = 1 + 0.024$$
$$= 1.024 \checkmark$$

$$(1.0007)^5 = (1+0.0007)^5 = 1 + 0.0007 \times 5 = 1 + 0.0035$$
$$= 1.0035 \checkmark$$

$$(1.02)^6 \simeq 1.12 \checkmark$$

$$\sqrt{0.99} = (0.99)^{1/2} = (1-0.01)^{1/2}$$

$$= \left(1 - \frac{0.01}{2}\right)$$

$$= (1 - 0.005)$$

$$= 0.995$$

$$\boxed{\begin{aligned} 1-0.1 &= 0.9 \\ 1-0.01 &= 0.99 \\ 1-0.001 &= 0.999 \end{aligned}}$$

$$\begin{array}{r} 0.995 \\ 0.005 \\ \hline 1.000 \end{array}$$

✓

$$\frac{1}{(1.004)^2} = (1.004)^{-2}$$

$$= (1 + 0.004)^{-2}$$

$$= \left[1 + (-2) \times 0.004\right]$$

hint

$$\frac{H/\omega}{}$$

H/W

$$\sqrt{1.006}$$

$$\sqrt{0.99}$$

$$\sqrt{0.96}$$

H/W

$$\frac{1}{(0.96)^2} =$$

$$\frac{1}{1.04} =$$

H/W

$\sqrt{0.98}$

H/W

$$\int \sin^2\theta \, d\theta$$

hint

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

$$\cos(2\theta) = 1 - 2\sin^2\theta$$

$$2\sin^2\theta = 1 - \cos(2\theta)$$

use this

$$\sin^2\theta = \frac{1}{2} - \frac{\cos(2\theta)}{2}$$

THANK YOU