



Padalsalai's Telegram Groups!

(தலைப்பிற்கு கீழே உள்ள லிங்கை கிளிக் செய்து குழுவில் இணையவும்!)

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- Lesson Plan - Group
<https://t.me/joinchat/NIfCqVWwo5iL-21gpzrXLw>
- 12th Standard - Group
https://t.me/Padalsalai_12th
- 11th Standard - Group
https://t.me/Padalsalai_11th
- 10th Standard - Group
https://t.me/Padalsalai_10th
- 9th Standard - Group
https://t.me/Padalsalai_9th
- 6th to 8th Standard - Group
https://t.me/Padalsalai_6to8
- 1st to 5th Standard - Group
https://t.me/Padalsalai_1to5
- TET - Group
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- PGTRB - Group
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- TNPSC - Group
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$$1). \int_0^a 3x^2 dx = 8 \Rightarrow 3 \left(\frac{x^3}{3} \right)_0^a = 8$$

$$\Rightarrow a^3 = 8 = 2^3$$

$$\therefore \boxed{a=2}$$

$$2). \int_0^1 x^2 e^{x^3} dx =$$

Let $t = x^3$ $\left\{ \begin{array}{l} \text{When } x=0, t=0 \\ x=1, t=1 \end{array} \right.$

$$\frac{dt}{dx} = 3x^2$$

$$\frac{dt}{3} = x^2 dx$$

$$\int_0^1 x^2 e^{x^3} dx = \int_0^1 e^t \frac{dt}{3} = \frac{1}{3} (e^t)_0^1$$

$$= \frac{1}{3} (e-1)$$

$$3). \text{ Given } \int_0^a \sqrt{x} dx = 4a \int_0^{\pi/4} \sin 2x dx$$

$$\left[\frac{x^{3/2}}{3/2} \right]_0^a = 4a \left[-\frac{\cos 2x}{2} \right]_0^{\pi/4}$$

$$\frac{2}{3} a^{3/2} = -2a (\cos 2x)_0^{\pi/4}$$

$$\frac{1}{3} a \times \sqrt{a} = -a [\cos 2 \times \frac{\pi}{4} - \cos 0]$$

$$\frac{\sqrt{a}}{3} = -[0-1] = 1$$

$$\sqrt{a} = 3 \Rightarrow a = 3^2 \Rightarrow \boxed{a=9}$$

$$4). \text{ Let } I = \int_0^{\pi/2} \frac{\sin 8x \log(\cot x)}{\cos 2x} dx \quad \rightarrow (1)$$

$$= \int_0^{\pi/2} \frac{\sin 8(\frac{\pi}{2}-x) \log(\cot(\frac{\pi}{2}-x))}{\cos 2(\frac{\pi}{2}-x)} dx$$

$$= \int_0^{\pi/2} \frac{\sin(4\pi-8x) \log(\tan x)}{\cos(\pi-2x)} dx$$

$$= \int_0^{\pi/2} \frac{-\sin 8x \log(\tan x)}{-\cos 2x} dx$$

$$I = \int_0^{\pi/2} \frac{\sin 8x \log(\tan x)}{\cos 2x} dx \rightarrow (2)$$

$$(1) + (2) \Rightarrow$$

$$2I = \int_0^{\pi/2} \frac{\sin 8x}{\cos 2x} [\log(\cot x) + \log(\tan x)] dx$$

$$2I = 0 \quad [\because \log \cot x \times \tan x = 0]$$

$$\boxed{I=0}$$

$$5). \text{ Let } I = \int_0^1 \tan^{-1} \left[\frac{2x-1}{1+x-x^2} \right] dx \rightarrow (1)$$

$$= \int_0^1 \tan^{-1} \left(\frac{2(1-x)-1}{1+(1-x)-(1-x)^2} \right) dx$$

$$= \int_0^1 \tan^{-1} \left(\frac{2-2x-1}{2-x-1-x^2+2x} \right) dx$$

$$= \int_0^1 \tan^{-1} \left(\frac{1-2x}{1+x-x^2} \right) dx$$

$$I = - \int_0^1 \tan^{-1} \left(\frac{2x-1}{1+x-x^2} \right) dx \rightarrow (2)$$

($\because \tan^{-1} x$ is an odd function)

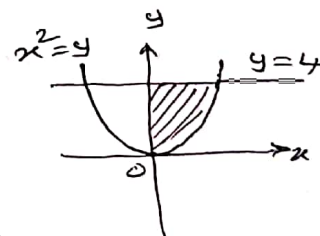
$$(1) + (2) \Rightarrow 2I = 0$$

$$\boxed{I=0}$$

6). Given

$$y = x^2$$

$$y = 4$$



$$\text{Area} = 2 \int_0^4 x dy$$

$$= 2 \int_0^4 \sqrt{y} dy = 2 \left[\frac{y^{3/2}}{3/2} \right]_0^4$$

$$= \frac{4}{3} \times 4^{3/2} = \frac{4}{3} \times 4 \times \sqrt{4}$$

$$= \frac{32}{3} \text{ sq. units.}$$

$$7). \int_0^{\pi/2} \frac{\sin x}{1+\cos^2 x} dx = \int_0^1 \frac{1}{1+t^2} (-dt)$$

$$= \int_0^1 \frac{dt}{1+t^2}$$

$$= [\tan^{-1}(t)]_0^1$$

Let $t = \cos x$

$$\frac{dt}{dx} = -\sin x$$

$$dt = -\sin x dx$$

When $x=0, t=1$
 $x=\frac{\pi}{2}, t=0$

$$= \tan^{-1}(1) - \tan^{-1}(0) = \frac{\pi}{4}.$$

8) Property: 12 P.No: 107. Vol-II

9) Given: $x-y=1$, x -axis,

$$x=-2 \text{ and } x=0$$

$$A = \int_{-2}^0 (-y) dx$$

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

$$= \left(x - \frac{x^2}{2} \right)_{-2}^0 = 0 - \left[-2 - \frac{4}{2} \right]$$

$$= 4 \text{ sq. units.}$$

$$10) \int_0^{\pi/4} \cos^8 2x dx = \int_0^{\pi/2} \cos^8 t \frac{dt}{2}$$

$$= \frac{1}{2} \int_0^{\pi/2} \cos^8 t dt$$

$$= \frac{1}{2} \times \frac{7}{8} \times \frac{5}{6} \times \frac{3}{4} \times \frac{1}{2} \times \frac{\pi}{2}$$

$$= \frac{35\pi}{512}$$

$$11) \int_0^{\infty} x^8 e^{-x/3} dx = \frac{8!}{\left(\frac{1}{3}\right)^9} = 3^9 18$$

Here

$$a = \frac{1}{3}$$

$$n = 8$$

Gamma Integral.

$$\int_0^{\infty} e^{-ax} x^n dx = \frac{n!}{a^{n+1}}$$

12) Given $y=x^3$, about y -axis

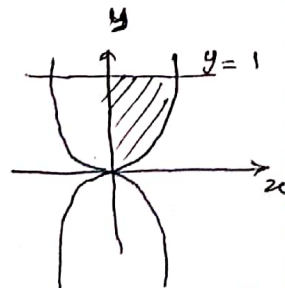
$$x=0 \text{ and } y=1$$

$$V = \pi \int_0^1 x^2 dy$$

$$= \pi \int_0^1 y^{2/3} dy$$

$$= \pi \left[\frac{y^{2/3+1}}{2/3+1} \right]_0^1$$

$$= \frac{3\pi}{5}$$



$$\therefore y = x^3$$

$$x^3 = y$$

$$x = y^{1/3}$$

13) $y = \sqrt{x}$, $y=2$ and $x=0$, about y -axis

$$V = \pi \int_0^2 x^2 dy$$

$$= \pi \int_0^2 y^4 dy$$

$$= \pi \left(\frac{y^5}{5} \right)_0^2 = \frac{32\pi}{5} \text{ sq. units}$$

$$\begin{cases} \therefore \sqrt{x} = y \\ x = y^2 \end{cases}$$

$$14) \int_{-\pi/2}^{\pi/2} x \sin x dx = ?$$

$x \sin x$ is an even function.

$$\int_{-\pi/2}^{\pi/2} x \sin x dx = 2 \int_0^{\pi/2} x \sin x dx$$

$$= 2 \left[-x \cos x + \sin x \right]_0^{\pi/2} \quad \begin{cases} u = x, & dv = \sin x dx \\ u' = 1 & v = -\cos x \\ u'' = 0 & v_1 = -\sin x \end{cases}$$

$$= 2 \times 1 = 2.$$

$$15) \int_0^1 x^2 e^x dx = ?$$

$$\int u dv = uv - u'v_1 + u''v_2 - \dots$$

$$\begin{cases} u = x^2 & dv = e^x dx \\ u' = 2x & v = e^x \\ u'' = 2 & v_1 = e^x \\ u''' = 0 & v_2 = e^x \end{cases}$$

$$\int_0^1 x^2 e^x dx = \left[x^2 e^x - 2x e^x + 2e^x \right]_0^1$$

$$= (e - 2e + 2e) - (0 - 0 + 2)$$

$$= e - 2$$

By TSPS, SVPR



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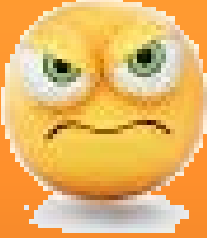


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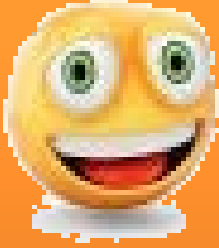


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