Nishant Jindal

$$M^T(M-I) = I - M^T = (I-M)^T$$

$$|M^T||M-I| = |I-M| = (-1)^3|M-I|$$

$$\boxed{3^{-9}} \neq |M-I|(|M|+1) = 0$$

$\log_2 3$

$$\boxed{3\cdot 2^{-k}} = 2^{-k}$$

2

$$\left(3^{\log_3 \boxed{\log_3 2}}\right)^{-1}$$

$= \log_2 3$

$$|A| = 0 = (ab-1)(c-d)$$

$$(\mathrm{adj}A)\,v = 0$$

$$\boxed{c = d\ ,\ g = h}$$

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$$\begin{bmatrix} 1 & \cdot & \cdot \\ \cdot & 1 & \cdot \\ \cdot & \cdot & 1 \end{bmatrix} \to {}^3C_2 + {}^3C_2\,{}^3C_1$$

$$\begin{vmatrix} a & \alpha & \beta \\ \alpha & b & \gamma \\ \beta & \gamma & c \end{vmatrix} = abc - a\gamma^2 - \alpha^2 c + \underline{2\alpha\beta\gamma} - b\beta^2$$

40's

$a = 0 = b$, $\alpha = 1$

$-\alpha^2$

$c = 1$

$\beta = 0$, $\gamma = 1$

$\beta = 1$, $\gamma = 0$

$\boxed{2 + 2 + 2}$

$\alpha = \beta = 0$

$= 1 - \gamma^2 - \alpha^2 - \beta^2 = 1 - \gamma^2 = 0$

ϕ

$(\mathrm{adj}\, A) \cup =$

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$$\begin{bmatrix} 0 & b \\ -b & 0 \end{bmatrix} \qquad \begin{vmatrix} a & b \\ b & a \end{vmatrix} \qquad a^2-b^2 = (a-b)(a+b)$$

b^2 ✓

$b=0$

$\frac{1}{2}\tan^{-1}\left(\frac{e^x}{2}\right)+c$

$\frac{1}{a}\tan^{-1}\left(\frac{\sin\alpha}{a}\right)+c$

$k_1 m = nQ_1 + R$

$k_2 m = nQ_2 + R$

$(k_2-k_1)m = n(Q_2-Q_1)$

$m, n \rightarrow$ coprime natural no. n

m
$2m$
$3m$
$\vdots$
$(n-1)m$

$/n$

leave all remainders from 1 to $n-1$

a	b
0	0
1	1
$\vdots$	
$p-1$	$p-1$
1	$p-1$
2	$p-2$
$\vdots$	
$p-1$	1

$2p-1$

$$\int (a^3)^x \, dx = \frac{(a^3)^x}{\ln a^3} + c$$

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73. $\int \left(\frac{1}{\sqrt{1-x^2}} + \left(-\frac{1}{2} \frac{-2x}{\sqrt{1-x^2}}\right) \right) dx$.

$\sin^{-1} x - \frac{1}{2} \times 2\sqrt{1-x^2}$

$= \sin^{-1} x - \sqrt{1-x^2} + C$.

$-2\sqrt{1-x^2} - \frac{2}{3}(\sin^{-1}x)^{3/2} + C$

$\int \sqrt{\frac{1-x}{1+x}}\, dx = \int \frac{(1-x)}{\sqrt{1-x^2}}\, dx$

$\frac{x}{1+x^4} - \frac{x^3}{1+x^4}$

$\int \frac{dx}{(x+\sqrt{x^2-1})^2}$

$x + \sqrt{x^2-1} = t$

$x - \sqrt{x^2-1} = \frac{1}{t}$

$x = \frac{1}{2}\left(t + \frac{1}{t}\right)$

$dx = \frac{1}{2}\left(1 - \frac{1}{t^2}\right) dt$

$= \frac{1}{2}\int \left(1 - \frac{1}{t^2}\right)\frac{1}{t^2}\, dt$

$\int (x - \sqrt{x^2-1})^2\, dx$.

$= \int \left(2x^2 - 1 - 2x\sqrt{x^2-1}\right) dx$

$= \frac{2x^3}{3} - x - \frac{2}{3}(x^2-1)^{3/2} + C$.

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$|y| = f(x)$

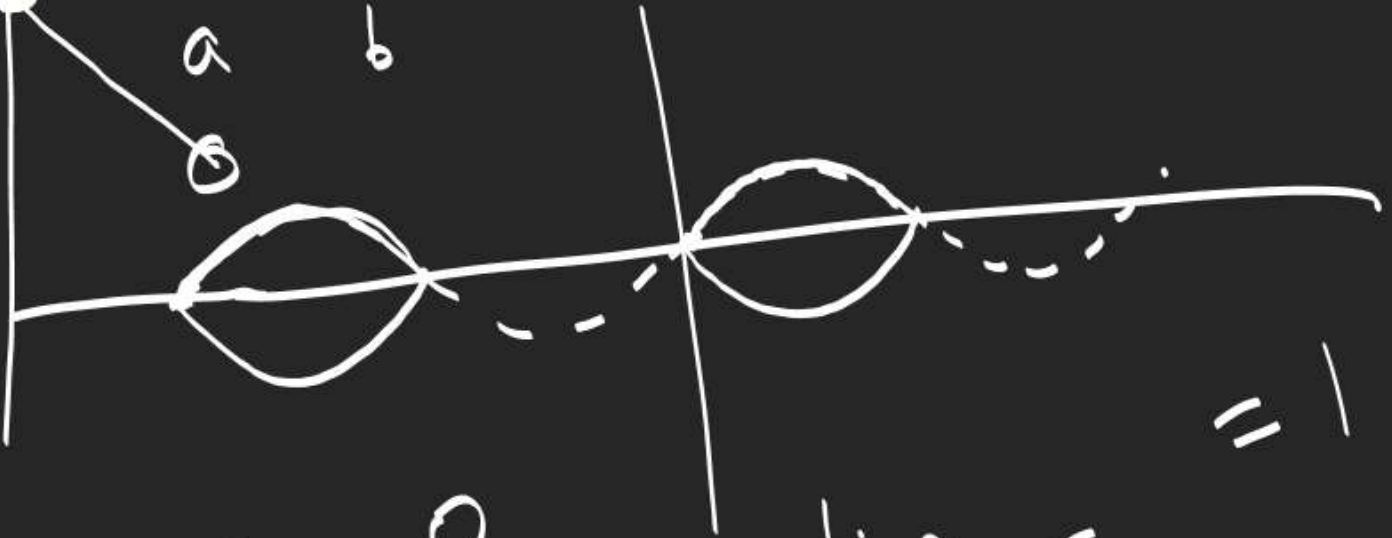
$f(x) < 0$

$y = f(x)$

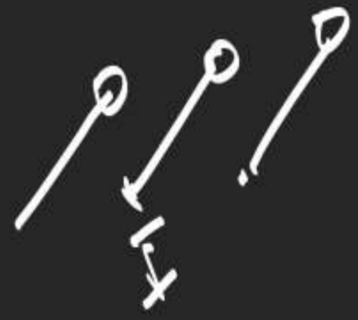
$\boxed{|y| = \sin x}$

$|y| = \frac{1}{2}$

$y = \pm \frac{1}{2}$



$\lim\limits_{x \to \frac{\pi}{2}^-} = 1$



$x \to 1^- \quad 2^{-\infty} = 0$

$x \to 1^+ \quad 2^{-0} = 1$

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$[-1, 1]$

$$\lim_{x \to 1^-} \lim_{n \to \infty} \left(1 + x^n\right)^{\frac{1}{n}} = \lim_{x \to 1^-} 1 = 1$$

$$\lim_{x \to 1^+} \lim_{n \to \infty} \frac{1}{1 + x^n} = \lim_{x \to 1^+} 0 = 0.$$

$x^3 + 1 + x^2 \ldots = 1 - x^2 +$

$x =$

$$f(1) = \lim_{n \to \infty} (1+1)^{\frac{1}{n}} = 1.$$

increasing

$D_f = [-1, 1]$

$$f(x) = \frac{\pi - \cos^{-1}x - \cot^{-1}x}{\cos^{-1}x + \cot^{-1}x} = \frac{\pi}{\cos^{-1}x + \cot^{-1}x} - 1$$

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$$g'(1) = \underline{f(2)}$$

$$x g''(x) + \underline{g'(x)} = f'(x+1)$$

$$g''(1) = f'(2) - f(2)$$

$$-2g''(3) = f'(2)$$

$$\frac{f(2) - \left(f'(2) - f(2)\right)}{-\frac{f'(2)}{2} + f(2)}$$

Nishant Jindal

1. $$\int \left(27e^{9x}+e^{12x}\right)^{\frac{1}{3}} dx = \frac{1}{3}\int 3e^{3x}\left(27+e^{3x}\right)^{\frac{1}{3}} dx$$

$$= \frac{1}{3}\times\frac{3}{4}\left(27+e^{3x}\right)^{4/3}+C = \frac{1}{4}\left(27+e^{3x}\right)^{4/3}+C.$$

2. $$\int \frac{x\,dx}{\sqrt{(1+x^2)+\sqrt{(1+x^2)^3}}} = \int \frac{x\,dx}{\sqrt{1+x^2}\,\sqrt{\underbrace{1+\sqrt{1+x^2}}}}$$

$$= 2\sqrt{1+\sqrt{1+x^2}}+C.$$

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Integrals of form $\int \sin^n x \cos^m x \, dx$

$(1-s^2)^3$ $\cancel{\cos x}$ $\cos x \, dx$

- If m is odd, put $\sin x = t$.
- If n is odd, put $\cos x = t$.
- If m, n both odd, put $\sin x = t$ or $\cos x = t$.
- If $m+n$ is negative even, put $\tan x = t$

$\tan^n x (1+\tan^2 x)^{...} \sec^2 x \, dx =$ $\int \frac{\sin^n x}{\cos^n x} \cos^{(m+n)} x \, dx$

- Others, use trigonometric manipulations.

Nishant Jindal

1. $\int \sin^{2023}x \cos^3 x\,dx = \int \sin^{2023}x(1-\sin^2 x)\cos x\,dx$

$= \int \left(\sin^{2023}x - \sin^{2025}x\right)\cos x\,dx.$

$= \frac{\sin^{2024}x}{2024} - \frac{\sin^{2026}x}{2026} + C.$

Matrices (remaining)

1781 - 1831

2. $\int \frac{dx}{\cos^{7/2}x \sin^{1/2}x} = \int \frac{dx}{\cos^4 x \sqrt{\tan x}} = \int \frac{(1+\tan^2 x)\sec^2 x\,dx}{\sqrt{\tan x}}$

$= 2\sqrt{\tan x} + \frac{2}{5}(\tan x)^{5/2} + C.$

3. $\int \sin^4 x \cos^2 x\,dx$ ✓