Nishant Jindal

$$\int \frac{dx}{x^2+a^2}$$

$$\frac{1}{a}\tan^{-1}\frac{x}{a}$$

Σq

$$\int \sec x\,dx = \ln|\sec x-\cot x|$$

$$= \ln|\tan \tfrac{x}{2}| + c$$

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

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

$$\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\ln\left|\frac{a+x}{a-x}\right|+c$$

1 2 3

$$\int \sqrt{a^2-x^2} = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\boxed{\sin^{-1}\frac{x}{a}+c}$$

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

1 2

$$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \boxed{\ln}\left(x+\sqrt{x^2\pm a^2}\right)$$

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

$\int \frac{dx}{x^2+(\sqrt{3})^2} \rightarrow \int \frac{dx}{x^2+a^2}$

$= \frac{1}{\sqrt{3}} \tan^{-1} \frac{x}{\sqrt{3}} + c$

Q $\int \frac{dx}{3-x^2} \rightarrow \int \frac{dx}{(\sqrt{3})^2 - x^2} \leftarrow \int \frac{dx}{a^2-x^2}$

$= \frac{1}{2\sqrt{3}} \ln \left| \frac{\sqrt{3}+x}{\sqrt{3}-x} \right| + c$

Q $\int \sqrt{4-x^2}\, dx$ $\quad \int \sqrt{a^2-x^2}\, dx$

$\int \sqrt{2^2-x^2}\, dx$

$= \frac{x}{2}\sqrt{2^2-x^2} + \frac{2^2}{2} \sin^{-1} \frac{x}{2} + c$

Q $\int \sqrt{19-x^2}\, dx \rightarrow \int \sqrt{a^2-x^2}$

$= \frac{x}{2}\sqrt{19-x^2} + \frac{19}{2} \sin^{-1} \frac{x}{\sqrt{19}} + c$

Q $\int \sqrt{x^2-19}\, dx = \int \sqrt{x^2-(\sqrt{19})^2}\, dx \rightarrow \int \sqrt{x^2-a^2}\, dx$

$= \frac{x}{2}\sqrt{x^2-19} - \frac{19}{2} \ln \left(x + \sqrt{x^2-19} \right) + c$

14) $\int \frac{1+\cos 2x}{1+\cos 2x}$

$\int \frac{1+\cos^2 x}{2\cos^2 x}$

$\Rightarrow \frac{1}{2}\int \frac{dx}{\cos^2 x} + \int \frac{\cancel{\cos^2 x}}{2\cancel{\cos^2 x}}\,dx$

$\Rightarrow \frac{1}{2}\int \sec^2 x + \int \frac{1}{2}\,dx$

$\Rightarrow \frac{1}{2}\tan x + \frac{x}{2} + C$

5 $\int a^x \cdot e^x \cdot dx$

$\int (ae)^x\,dx \longrightarrow \int A^x\,dx = \frac{A^x}{\ln A}$

$= \frac{(ae)^x}{\ln ae} + C$

Trick

19) $\int \sin x\, d(\sin x)$ $\quad \sin x = y$

$\int y\, dy = \frac{y^2}{2} + C$

$= \frac{\sin^2 x}{2} + C$

20) $\int \tan^3 x \cdot d(\tan x)$

$\int y^3\,dy = \frac{y^4}{4} + C$

$= \frac{\tan^4 x}{4} + C$

Q8 $3.4\int x^{-.17}\,dx$

$(3.4)\,\frac{x^{-.17+1}}{-.17+1} + C$

$(3.4)\,\frac{x^{.93}}{.93} + C$

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G B Sir Pro Army 12th.

Q 7 $\int \frac{dh}{\sqrt{2gh}}$ $\rightarrow$ h var, g = const

$\int \frac{dx}{\sqrt{x}} = 2\sqrt{x}$

$\frac{1}{\sqrt{2g}} \int \frac{dh}{\sqrt{h}}$

$\frac{2\sqrt{h}}{\sqrt{2g}} + 1$

Q 9 $\int \frac{\sqrt{x}}{x^3} - \frac{\cancel{x^3} \cdot e^x}{\cancel{x^3}} + \frac{\cancel{x^2}}{\cancel{x^3}} dx$

$\int x^{-\frac{5}{2}} dx - \int e^x dx + \int \frac{1}{x} dx$

Q 26 $\int \frac{\sin x \, dx}{\cos^2 x}$

$\int \frac{\sin x}{\cos x} \times \frac{1}{\cos x} dx$

$\int \sec x \tan x \, dx$

$\sec x + C$

Q 23 $\int (8-3x)^{\frac{6}{5}} dx$

$= \frac{(8-3x)^{\frac{6}{5}+1}}{\frac{11}{5} \times (-3)} + C$

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

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

$\int x^{-3/2} - 2 \cdot x^{-1/2} + x^{1/2} dx$

3 * 12) $\int \frac{dx}{\sqrt{3 - 3x^2}} = \frac{1}{\sqrt{3}} \int \frac{dx}{\sqrt{1^2 - x^2}} \rightarrow \int \frac{dx}{\sqrt{a^2 - x^2}}$

$= \frac{1}{\sqrt{3}} \times \sin^{-1} \frac{x}{1} + C$

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Q 19 $\int \sin x \, d(\sin x)$

(M1) $\frac{d(\sin x)}{dx} = \cos x$

$d(\sin x) = \cos x \, dx$

$\int \sin x \cdot \cos x \cdot dx$

$\frac{1}{2}\int 2\sin x \cdot \cos x \, dx$

$\frac{1}{2}\int \sin 2x \, dx$

$-\frac{1}{2}\frac{\cos(2x)}{2} + C$ Ans 1

$\Rightarrow \frac{2\sin^2 x - 1}{4} + C$

$\Rightarrow \frac{\sin^2 x}{2} + C'$

M2 $\sin x = y$

$\int y \cdot dy$

$= \frac{y^2}{2} + 1$

$= \frac{\sin^2 x}{2} + c$

Ans 2

$\int$ Trigo fxn can give 2 or more different Answers.

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

$\int \frac{dx}{x^2-a^2}$ $\frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right|$

$\int \frac{dx}{a^2-x^2}$ $\frac{1}{2a}\ln\left|\frac{a+x}{a-x}\right|$

$\int \frac{dx}{\sqrt{x^2+a^2}}$ $\ln(x+\sqrt{\ })$

$\int \frac{dx}{\sqrt{x^2-a^2}}$ $\ln(x+\sqrt{\ }$

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

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Q $\int \frac{dx}{4x^2+5} \rightarrow \int \frac{dx}{(2x)^2+(\sqrt{5})^2} \rightarrow \int \frac{dx}{x^2+a^2}$

$= \frac{1}{2\sqrt{5}} \tan^{-1} \frac{2x}{\sqrt{5}} + C$

Q $\int \frac{dx}{7x^2+3} = \int \frac{dx}{(\sqrt{7}x)^2+(\sqrt{3})^2} \rightarrow \int \frac{dx}{x^2+a^2}$

$\frac{1}{\sqrt{7}\sqrt{3}} \tan^{-1} \frac{\sqrt{7}x}{\sqrt{3}} + C$

Q $\int \frac{dx}{\sqrt{4x^2+3}} = \int \frac{dx}{\sqrt{(2x)^2+(\sqrt{3})^2}} \rightarrow \int \frac{dx}{\sqrt{x^2+a^2}}$

$= \frac{1}{2} \ln\left\{2x + \sqrt{4x^2+3}\right\} + C$

Q $\int \frac{dx}{\sqrt{4-3x^2}} \rightarrow \int \frac{dx}{\sqrt{(2)^2-(\sqrt{3}x)^2}} \rightarrow \int \frac{dx}{\sqrt{a^2-x^2}}$

$= \frac{1}{\sqrt{3}} \sin^{-1} \frac{\sqrt{3}x}{2} + C$

$\int \sqrt{1-x^2}\, dx \rightarrow \int \sqrt{a^2-x^2}$

$\frac{x}{2}\sqrt{\quad} + \frac{a^2}{2} \sin^{-1} \frac{x}{a} + C$

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

Q $\displaystyle\int \frac{dx}{\sqrt{2x^2-1}}$

$\displaystyle\int \frac{dx}{\sqrt{(\sqrt{2}x)^2-1^2}} \rightarrow \int \frac{dx}{\sqrt{x^2-a^2}}$

$\dfrac{1}{\sqrt{2}} \ln\left\{\sqrt{2}x+\sqrt{2x^2-1}\right\}+c$

Q $\displaystyle\int \sqrt{3x^2+4}\,dx$

$\displaystyle\int \sqrt{(\sqrt{3}x)^2+2^2}\,dx \rightarrow \int\sqrt{x^2+a^2}$

$\dfrac{1}{\sqrt{3}}\left(\dfrac{\sqrt{3}x}{2}\sqrt{3x^2+4}+\dfrac{2^2}{2}\ln\left\{\sqrt{3}x+\sqrt{3x^2+4}\right\}\right)+c$

Q $\displaystyle\int \sqrt{x^2-4x+6}\,dx$

$\displaystyle\int \sqrt{x^2-4x+4+2}\,dx$

$\displaystyle\int \sqrt{(x-2)^2+(\sqrt{2})^2}\,dx \rightarrow \int\sqrt{x^2+a^2}$ जैसा

$\dfrac{1}{1}\left(\dfrac{x-2}{2}\sqrt{x^2-4x+6}+\dfrac{(\sqrt{2})^2}{2}\ln\left\{(x-2)+\sqrt{x^2-4x+6}\right\}\right)+c$

Q $\int x\cdot(3x+5)^7\,dx$

$\frac{1}{3}\int 3x\,(3x+5)^7\,dx$

t.me/+kpOcxD4Mx4MzYWI1

$\Rightarrow \frac{1}{3}\int((3x+5)-5)\,(3x+5)^7\,dx$

$\Rightarrow \frac{1}{3}\int (3x+5)^8 - 5(3x+5)^7\,dx$

$\Rightarrow \frac{1}{3}\int (3x+5)^8\,dx - \frac{5}{3}\int (3x+5)^7\,dx$

$\Rightarrow \frac{1}{3}\,\frac{(3x+5)^9}{9\times 3} - \frac{5}{3}\,\frac{(3x+5)^8}{8\times 3} + C$

Q $\int x\cdot(2x+3)^5\cdot dx$

$\frac{1}{2}\int((2x+3)-3)\,(2x+3)^5\,dx$

$\frac{1}{2}\int(2x+3)^6 - \frac{3}{2}\int(2x+3)^5\,dx$

$\frac{1}{2}\,\frac{(2x+3)^7}{7\times 2} - \frac{3}{2}\times\frac{(2x+3)^6}{6\times 2} + C$

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Q $\displaystyle\int \frac{dx}{x^2+\boxed{2x}+2}$

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

$\displaystyle\int \frac{dx}{(x+1)^2+1^2} \longrightarrow \int \frac{dx}{x^2+A^2}$

$\frac{1}{1}\tan^{-1}\frac{x+1}{1}+C$

4) $\boxed{13}x - x^2 \quad \frac{13}{2}$

$\left(\frac{13}{2}\right)^2-\left(x-\frac{13}{2}\right)^2$

5) $\boxed{9}x - x^2$

$\left(\frac{9}{2}\right)^2-\left(x-\frac{9}{2}\right)^2$

1) $x^2+\boxed{13}x+14 \quad \frac{13}{2}$

$=\left(x+\frac{13}{2}\right)^2-\left(\frac{13}{2}\right)^2+14$

2) $x^2-9x+3 \quad 9/2$

$\left(x-\frac{9}{2}\right)^2-\left(\frac{9}{2}\right)^2+3$

3) $2x^2+7x+5$

$2\left\{x^2+\frac{7}{2}x+\frac{5}{2}\right\} \quad 7/4$

$2\left\{\left(x+\frac{7}{4}\right)^2-\left(\frac{7}{4}\right)^2+\frac{5}{2}\right\}$

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Q $\int \frac{dx}{4x^2-4x-3}$

$\frac{1}{4}\int \frac{dx}{x^2-(x-\frac{3}{4}}$ $\frac{1}{2}$

$-\frac{1}{4}-\frac{3}{4}=-1$

$\frac{1}{4}\int \frac{dx}{(x-\frac{1}{2})^2-(\frac{1}{2})^2-\frac{3}{4}}$

$\frac{1}{4}\int \frac{dx}{(x-\frac{1}{2})^2-(1)^2}$ $\int \frac{dx}{x^2-a^2}$

$\frac{1}{4}\times\frac{1}{2\times 1}\ln\left|\frac{(x-\frac{1}{2})-1}{(x-\frac{1}{2})+1}\right|+c$

Q $\int \frac{dx}{\sqrt{x-x^2}}$ $\frac{1}{2}$

in Qs of Q Eqn alway try to make Per. Sqr & Use Basic formu

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

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

Q $\int \frac{dx}{\sqrt{\boxed{2a}x-x^2}}$ a

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

$\sin^{-1}\frac{x-a}{a}+c$

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MJA AA Jatu Agrrrrr.....

Q $\int \frac{1+2x^2}{x^2(1+x^2)}\,dx$

$\int \frac{\cancel{1+x^2}}{x^2\cancel{(1+x^2)}} + \frac{\cancel{x^2}}{\cancel{x^2}(1+x^2)}$

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

$-\frac{1}{x} + \frac{1}{1}\tan^{-1}\frac{x}{1}+C$

$\tan^{-1}x - \frac{1}{x} + C$

Q $\int \frac{(1+x)^2}{x(1+x^2)}\,dx$

$\Rightarrow \int \frac{\cancel{1+x^2}}{x\cancel{(1+x^2)}} + \frac{2x}{x(1+x^2)}\,dx$

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

$\ln|x| + 2\tan^{-1}x + C$

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Nr's Deg $\geq$ Dr's Deg

If Nr's Deg $\geq$ Dr's Deg then divide.

M1

Q $\int \frac{x^4}{x^2+1}\,dx$

$\int \frac{x^4-1\quad+1}{x^2+1}$

$\int \frac{\cancel{x^4-1}^{\,x^2-1}}{\cancel{x^2+1}} + \frac{1}{x^2+1^2}\,dx$

$\frac{x^3}{3} - x + \frac{1}{1}\tan^{-1}\frac{x}{1} + C$

Q $\int \frac{x^4}{x-1}\,dx$

$\int \frac{x^4-1\qquad+1}{(x-1)}$

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

$\int \frac{1}{x}$

$\int \frac{\cancel{(x^2-1)}^{\,x+1}(x^2+1)}{\cancel{(x-1)}} + \ln|x-1|$

$\int x^3+x^2+x+1\,dx + \ln|x-1|$

$\Rightarrow \frac{x^4}{4} + \frac{x^3}{3} + \frac{x^2}{2} + x + \ln|x-1| + C$

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

$(x^3-1) = (x-1)(x^2+x+1)$

$(x^4-1) = (x-1)(x^3+x^2+x+1)$

$(x^{17}-1) = (x-1)(x^{16}+x^{15}+x^{14}\cdots x+1)$

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

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

Mjaula.

$$\int \frac{(\sqrt{x}+1)((\sqrt{x})^3-1)}{((\sqrt{x})^2+\sqrt{x}+1)}$$

$x^3-1=(x-1)(x^2+x+1)$

Nr Deg > Dr

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

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

$$\boxed{\begin{aligned} x^6+1 &= (x^2)^3+1^3 \\ &= (x^2+1)(x^4-x^2+1) \end{aligned}}$$

Q $\displaystyle\int \frac{x^4+1}{x^6+1}\,dx$

$$\int \frac{x^4+1}{(x^2+1)(x^4-x^2+1)}\,dx \quad \Rightarrow \tan^{-1}x+\frac{1}{3}\tan^{-1}(x^3)+C$$

$$\int \frac{\cancel{x^4-x^2+1}}{(x^2+1)\cancel{(x^4-x^2+1)}} + \frac{x^2}{(x^2+1)(x^4-x^2+1)}\,dx$$

$$\int \frac{dx}{x^2+1} + \frac{1}{3}\int \frac{3x^2\,dx}{x^6+1}$$

$$\tan^{-1}x + \frac{1}{3}\int \frac{d(x^3)}{(x^3)^2+1^2} = \tan^{-1}x+\frac{1}{3}\int \frac{dy}{y^2+1^2} = \tan^{-1}x+\frac{1}{3}\tan^{-1}y$$