Nishant Jindal

DPP4

9) $\int \cos^2 x \cdot \sqrt{\sin x} \cdot \cos x$

$\int (1-\sin^2 x)\sqrt{\sin x} \cdot \cos x$

$\sin x = t$

6) $\log(x+\sqrt{x^2+1}) = t$

20) hold

19) $\int \sqrt{\sec x - 1}\, dx$

$\int \sqrt{\frac{1-\cos x}{\cos x}} \cdot dx = \int \sqrt{\frac{2\sin^2 x/2}{2\cos^2 \frac{x}{2} - 1}} \cdot dx = \sqrt{2}\int \frac{\sin \frac{x}{2}}{\sqrt{(\sqrt{2}\cos \frac{x}{2})^2 - 1^2}}$

$\sqrt{2}\cos \frac{x}{2} = t$

$\cancel{\sqrt{2}} \times \sin \frac{x}{2} \times \frac{1}{\cancel{2}_{\sqrt{2}}} \cdot dx = dt$

$= 2\int \frac{dt}{\sqrt{t^2 - 1^2}} \rightarrow \int \frac{dx}{\sqrt{x^2 - a^2}}$

(16)* $\int \frac{\sqrt{\tan x} \cdot dx}{\sin x \cdot \cos x}$

$\int \frac{\sqrt{\sin x}}{\sqrt{\cos x}} \times \frac{1}{\sin x \cdot \cos x}$

$\int \frac{dx}{(\sin x)^{1/2}(\cos x)^{3/2}} \frac{dx \cdot (\cos x)^{1/2}}{(\cos x)^{1/2}}$ $\quad \frac{1}{2} + \frac{3}{2} = 2$ make $\tan x$ in Dr

$2\sqrt{t} \Leftarrow \int \frac{dt}{\sqrt{t}} \Leftarrow \int \frac{\sec^2 x \cdot dx}{(\tan x)^{1/2}}$

$\tan x = t$

$\sec^2 x\, dx = dt$

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Q 22 $\int \frac{dx}{\sin^{3/2}x \cdot \cos^{5/2}x}$ $\quad \frac{3}{2}+\frac{5}{2}=4$

Even.

$\int \frac{dx}{\frac{\sin^{3/2}x \cdot \cos^{5/2}x \cdot \cos^{3/2}x}{(\cos^{3/2})x}}$

$\tan x = t$

$\sec^2 x\, dx = \cdot$

$\int \frac{\sec^2 x \cdot \sec^2 x}{(\tan x)^{\frac{3}{2}}} \cdot dx = \int \frac{(1+\tan^2 x)\cdot \sec^2 x}{(\tan x)^{3/2}}$

$\int \frac{(1+t^2)\,dt}{t^{3/2}} = \int t^{-3/2} + t^{1/2} \cdot dt$

(13) $x + \tan^{-1} x = t$

$1 + \frac{1}{1+x^2} \cdot dx = dt$

$\frac{x^2+1}{x^2+1} \cdot dx = dt$

Q 26 $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} \cdot dx$

30, 31, 32 hold

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

$\int \frac{1-\sqrt{x}}{1-x} \cdot dx$

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

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$$\int \frac{1}{x} \cdot dx = \ln|x|$$

$$\int \frac{1}{x^2} \cdot dx = -\frac{1}{x}$$

$$\int \frac{1}{\sqrt{x}} = 2\sqrt{x}$$

$$\int \sqrt{x} \cdot dx = \frac{2}{3} x^{3/2}$$

$$\int \sin x = -\cos x$$

$$\int a^x = \frac{a^x}{\ln a}$$

$$\int \cos x = \sin x$$

$$\int \tan x = \ln|\sec x|$$

$$\int \operatorname{cosec} x \cdot dx = \ln|\sin x|$$

$$\int \sec x \, dx = \ln|\sec x + \tan x| = \ln\left|\tan\left(\frac{\pi}{4} + \frac{x}{2}\right)\right|$$

$$\int \sec^2 x = \tan x$$

$$\int \operatorname{cosec}^2 x = -\cot x$$

$$\int \sec x \tan x = \sec x$$

$$\int \operatorname{cosec} x \cdot \cot x = -\operatorname{cosec} x$$

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

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

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

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

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

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

$$\int \sqrt{x^2+a^2}\cdot dx = \frac{x}{2}\sqrt{} \quad + \frac{a^2}{2}\cdot\ln|$$

$$\int \sqrt{x^2-a^2}\cdot dx = \frac{x}{2}\sqrt{} \quad - \frac{a^2}{2}\ln\cdot$$

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

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Q $$\int \frac{(x^2-1)+\tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1)\cdot\tan^{-1}\left(\frac{x^2+1}{x}\right)}\cdot dx$$

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Sin 2x Based Qs.

A) Sin 2x is in Nr.

Q $\int \frac{\sin 2x \cdot dx}{1+2\sin^2 x}$ Q $\int \frac{\sin 2x \cdot dx}{3+4\cos^2 x}$.

Q $\int \frac{\sin 2x}{3\sin^2 x+4\cos^2 x}$ Q $\int \frac{\sin 2x}{a^2+b^2\sin^2 x}$

Q $\int \frac{\sin 2x \cdot dx}{\sqrt{a^2\sin^2 x+b^2\cos^2 x}}$

Q2 $\int \frac{\sin 2x \cdot dx}{3+4\cos^2 x}$ $3+4\cos^2 x = t$

$0+4\times -2\sin x \cdot \cos x \cdot dx = dt$

$\sin 2x \cdot dx = -\frac{dt}{4}$

$-\frac{1}{4}\int \frac{dt}{t}$

$\Rightarrow -\frac{1}{4}\ln|t|+c$

Q5 $\int \frac{\sin 2x \cdot dx}{\sqrt{a^2\sin^2 x+b^2\cos^2 x}}$

$a^2\sin^2 x+b^2\cos^2 x = t$

$a^2\sin 2x - b^2\sin 2x \cdot dx = dt$

$\sin 2x(a^2-b^2)\cdot dx = dt$

$\sin 2x \cdot dx = \frac{dt}{a^2-b^2}$

$\frac{1}{a^2-b^2}\int \frac{dt}{\sqrt{t}}$

$\frac{2\sqrt{t}}{a^2-b^2}+c$

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(B) When $\sin 2x$ is in Dr.

$$\sin 2x \rightarrow \begin{cases} (1+\sin 2x)-1 \ \checkmark \\ 1-(1-\sin 2x) \ \checkmark \end{cases}$$

Remove

Q. $\int \frac{\sin x+\cos x}{9+16\sin 2x}$ Q $\int \frac{\cos x-\sin x}{7-9\sin 2x}$

Q $\int \frac{1}{\sin x+\sec x}$ Q $\int \frac{\sin x+\cos x}{\sqrt{\sin 2x}}$

Q $\int \frac{\cos x-\sin x}{\sqrt{\sin 2x}}$ Q $\int \frac{\cos x}{\sqrt{\sin 2x}}$

Q1 $\int \frac{\sin x+\cos x}{\sqrt{\sin 2x}} = \int \frac{\sin x+\cos x}{\sqrt{1-(1-\sin 2x)}} = \int \frac{\sin x+\cos x \cdot dx}{\sqrt{1-(\sin x-\cos x)^2}}$

$= \int \frac{dt}{\sqrt{1-t^2}} = \sin^{-1} t + c$

$\sin x-\cos x = t$

$(\cos x+\sin x)dx = dt$

Q2 $\int \frac{\cos x-\sin x \cdot dx}{\sqrt{\sin x}} = \int \frac{\cos x-\sin x}{\sqrt{(1+\sin 2x)-1}} = \int \frac{\cos x-\sin x \cdot dx}{\sqrt{(\sin x+\cos x)^2-1}}$

$\int \frac{dt}{\sqrt{t^2-1^2}} = \ln\left|t+\sqrt{t^2-1}\right| + c$

Yad

$\rightarrow$ Stindime Padho

$\sin x+\cos x = t$

$(\cos x-\sin x)dx = dt$

B Q3 $\int \frac{\cos x}{\sqrt{\sin 2x}} dx = \frac{1}{2}\int \frac{2\cos x}{\sqrt{\sin 2x}} \cdot dx = \frac{1}{2}\int \underbrace{\frac{\cos x+\sin x}{\sqrt{\sin 2x}}}_{Q1} + \underbrace{\frac{\cos x-\sin x}{\sqrt{\sin 2x}}}_{Q2}$

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Q $\int \frac{dx}{\sin x+\sec x} = \int \frac{\cos x\cdot dx}{\sin x\cdot\cos x+1} = \int \frac{2\cos x}{2+\sin 2x}\cdot dx$

$= \int \frac{\cos x+\sin x}{2+\sin 2x} + \frac{\cos x-\sin x}{2+\sin 2x}\cdot dx$

$\Rightarrow \int \frac{\cos x+\sin x\cdot dx}{2+1-(1-\sin 2x)} + \int \frac{\cos x-\sin x}{2+(1+\sin 2x)-1}$

$\Rightarrow \int \frac{\cos x+\sin x\cdot dx}{3-(\sin x-\cos x)^2} + \int \frac{\cos x-\sin x\cdot dx}{1+(\sin x+\cos x)^2}$

$\Rightarrow 2\int \frac{dt}{(2-t^2)(1+t^2)} = \frac{2}{3}\int \frac{3\,dt}{(2-t^2)(1+t^2)}$

$\Rightarrow \frac{2}{3}\int \frac{(2-t^2)+(1+t^2)}{(2-t^2)(1+t^2)}\,dt$ Sep & Int

Q** $\int \frac{dx}{\cos^3 x-\sin^3 x} = \int \frac{dx}{(\cos x-\sin x)(\cos^2 x+\sin^2 x+\sin x\cos x)}$

yad

$\Rightarrow 2\int \frac{dx}{(\cos x-\sin x)(2+\sin 2x)}$

$\Rightarrow 2\int \frac{(\cos x-\sin x)\cdot dx}{(\cos x-\sin x)^2\cdot(2+\sin 2x)}$

$\Rightarrow 2\int \frac{(\cos x-\sin x)\,dx}{(1-\sin 2x)(2+\sin 2x)}$ $\xrightarrow{}$ $\frac{2}{4}$ $(\sin x+\cos x)' \frac{1}{c}$

$\Rightarrow 2\int \frac{(\cos x-\sin x)\,dx}{(1-(1+\sin 2x)+1)(2+(1+\sin 2x)-1)}$

$\sin x+\cos x=t$

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

$(\cos x-\sin x)\,dx = dt$

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Q $\int \frac{dx}{x^{2008}+x} = \int \frac{1+x^{2007}-x^{2007}}{x(x^{2007}+1)}$

Q $\int \frac{dx}{(x)(x+1)(\ln(x+1)-\ln x)^{10}}$

$\ln(x+1)-\ln x = t$

$\Rightarrow \int \frac{\cancel{1+x^{2007}}}{x(\cancel{1+x^{2007}})} - \int \frac{x^{2006}}{x(x^{2007}+1)} \cdot dx$

$x^{2007}+1=t$

Q $\int \frac{\cos x+\sin x \cdot dx}{x(\cos x - x)} \Rightarrow \ln|x| - 2007\int \frac{dt}{t}$

$\int \frac{\cos x+\sin x \cdot dx}{x^2\left(\frac{\cos x}{x}-1\right)}$ $\quad \frac{\cos x}{x}-1=t$

Q $\int \frac{\cos^6 x \cdot dx}{\sin^4 x\left(\cos^7 x+\sin^7 x\right)^{4/7}}$ $\cos^7 x$ Com.

$\int \frac{\cos^6 x\, dx}{\sin^4 x \cdot \cos^4 x \cdot\left(1+\tan^7 x\right)^{4/7}} \div \cos^8 x$

$\int \frac{\sec^2 x \cdot dx}{\tan^4 x\left(1+\tan^7 x\right)^{4/7}}$

$\tan x = t$

$\int \frac{dt}{t^4(1+t^7)^{4/7}}$ $\to t^7$ Com.

$\int \frac{dt}{t^8\left(1+\frac{1}{t^7}\right)^{4/7}}$

let $1+\frac{1}{t^7}=Z$

$-\frac{7}{t^8}\cdot dt = dZ$

$\frac{dt}{t^8} = -\frac{dZ}{7}$

$-\frac{1}{7}\int \frac{dZ}{(Z)^{4/7}}$

$-\frac{1}{7}\int Z^{-4/7}\, dZ$

Q $\int \frac{\sec^2 x \cdot dx}{(\tan^{101}x+\tan x)} = g(x)+c$

$g\left(\frac{\pi}{4}\right) = -\frac{\ln 2}{100}$ then $\lim_{x\to\frac{\pi}{2}} g(x) = ?$

$\int \frac{\sec^2 x \cdot dx}{\tan^{101}x\left(1+\tan^{-100}x\right)}$

$1+\tan^{-100}x = t$

$-100\tan^{-101}x \cdot \sec^2 x\, dx = dt$

$\frac{\sec^2 x \cdot dx}{\tan^{101}x} = -\frac{dt}{100}$

$-\frac{1}{100}\int \frac{dt}{t} = -\frac{1}{100}\ln|t|+c$

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Q $\displaystyle\int \frac{\left(p\cdot x^{p+2q-1}-q\cdot x^{q-1}\right)}{x^{2p+2q}+2x^{p+q}+1}dx$

$\Rightarrow \displaystyle\int \frac{p\cdot \_\_\_\_\_\_\_\_}{\left(x^{p+q}+1\right)^2}dx$

$\Rightarrow \displaystyle\int \frac{p\cdot x^{p+2q-1}-q\cdot x^{q-1}}{x^{2q}\left(x^{p}+x^{-q}\right)^2}$

$\Rightarrow \displaystyle\int \frac{p\cdot x^{p-1}-q\cdot x^{-q-1}}{\left(x^{p}+x^{-q}\right)^2}$ $\quad x^{p}+x^{-q}=t$

$\displaystyle\int \frac{dt}{t^2}=-\frac{1}{t}+c$

Q $\displaystyle\int \frac{x^3-1}{(x^4+1)(x+1)}$

$\Rightarrow \displaystyle\int \frac{(x^4+x^3)-x^4-1}{(x^4+1)(x+1)}\cdot dx$

$\displaystyle\int \frac{x^3\cancel{(x+1)}}{\underbrace{(x^4+1)}_{t}\cancel{(x+1)}}-\frac{1\cancel{(x^4+1)}}{\cancel{(x^4+1)}(x+1)}\cdot dx$

$\Rightarrow \displaystyle\frac{1}{4}\int \frac{dt}{t}-\ln|x+1|+c$