Nishant Jindal

1) $\int \frac{1}{x}\,dx = \ln|x| + c$

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

3) $\int \frac{1}{\sqrt{x}}\,dx = 2\sqrt{x}\,dx$

4) $\int \sqrt{x}\,dx = \frac{2}{3}x^{3/2}$

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

6) $\int \cos x\,dx = \sin x$

7) $\int \tan x\,dx = \ln|\sec x|$

8) $\int \cot x\,dx = \ln|\sin x|$

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

10) $\int \operatorname{cosec} x\,dx = \ln|\operatorname{cosec} x - \cot x| = \ln \tan\frac{x}{2} + c.$

11) $\int \sec^2 x\,dx = \tan x + c$

12) $\int \operatorname{cosec}^2 x\,dx = -\cot x + c$

13) $\int \sec x \tan x\,dx = \sec x + c$

14) $\int \operatorname{cosec} x \cot x\,dx = -\operatorname{cosec} x + c$

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

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

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

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

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

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

$$\int \sqrt{x^2+a^2}\,dx = \frac{x}{2}\sqrt{} + \frac{a^2}{2}\ln$$

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

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

$$\int \frac{dx}{4x^2+9}$$

$$\int \frac{dx}{(2x)^2+3^2} = \frac{1}{3\times 2}\tan^{-1}\frac{2x}{3}$$

$$\int \frac{dx}{\sqrt{4x^2-9}} = \int \frac{dx}{\sqrt{(2x)^2-3^2}}$$

$$= \frac{1}{2}\ln\left|2x+\sqrt{4x^2-9}\right|$$

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$\sin^2 A - \sin^2 B.$

$= \sin(A+B)\cdot\sin(A-B)$

$\int \sin\left(\frac{9\pi}{8}+\frac{x}{4}+\frac{7\pi}{8}+\frac{x}{4}\right)\cdot\sin\left(\frac{9\pi}{8}+\cancel{\frac{x}{4}}-\frac{7\pi}{8}-\cancel{\frac{x}{4}}\right)$

$\frac{1}{12}\int \sin\left(2\pi+\frac{x}{2}\right)$

Q_3 $\quad g'(x^2)=x^3 \quad x^2=t$

$g'(t)=(x^2)^{3/2}=t^{3/2}$

$g'(x)=x^{3/2}$

$g(x)=\int x^{3/2}\,dx=\frac{2}{5}x^{5/2}+c=\frac{2}{5}x^{5/2}+\frac{3}{5}$

$g(1)=1$

$=\frac{2}{5}(1)^{5/2}+c=1$

$c=1-\frac{2}{5}=\frac{3}{5}$

$g(4)=\frac{2}{5}(4)^{5/2}+\frac{3}{5}=\frac{64}{5}+\frac{3}{5}$

$\int \sin\alpha\cdot\sin(x-\alpha)\,dx+\frac{1}{2}\int 2\sin^2\left(\frac{x}{2}-\alpha\right)dx$

$\cos(x-2\alpha)$

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

$-\sin\alpha\cdot\frac{\cos(x-\alpha)}{1}+\frac{1}{2}\left[\frac{x}{2}-\frac{1}{4}x\frac{\sin(x-2\alpha)}{1}\right]+c$

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$$6 \int \frac{\cot^2(2x)-1}{2\cot 2x} - \frac{\cos 8x}{\tan 4x}\, dx$$

$$\int \left(\frac{1-\tan^2 2x}{2\tan 2x}\right) - \frac{\cos 8x}{\tan 4x}\, dx$$

$$\int \frac{1}{\tan 4x} - \frac{\cos 8x}{\tan 4x}\, dx$$

$$\int \frac{1}{\tan 4x}\left(1-\cos 8x\right) dx$$

$$\int \frac{1}{\tan 4x} \times 2\sin^2(4x) = \int \frac{2\sin^2 4x}{\cancel{\sin 4x}} \times \cos 4x$$

$$\int \sin 8x\, dx$$

7 ✓, 8 ÷ 9, conf. 10 ✓, 11 ✓, 12 hold, 13 hold

$$(15) \int (1+\sin 2x) - (1+\sin 2K)$$

$$\int (\cos x+\sin x)^2 - (\cos K-\sin K)^2$$

$$\int (\cos x+\sin x+\cos K-\sin K)(\cos x+\sin x-\cos K+\sin K)$$

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Q 16 $\int \frac{x^2+1}{x^6(x^2+1)} + \int \frac{2\,dx}{x^6(x^2+1)}$

$+2\int \frac{\overset{x^4-x^2+1}{\cancel{1+x^6}}}{x^6\cancel{(x^2+1)}} \quad -2\int \frac{\cancel{x^6}\cdot dx}{\cancel{x^6}(x^2+1)}$

$\int \frac{dx}{x^6} \quad +2\int x^{-2}-x^{-4}+x^{-6}\,dx - 2\tan^{-1} x$

18) $\int x^x \ln(ex)\cdot d$

$\int x^x(\ln e+\ln x)$

$\int \boxed{x^x}(1+\ln x)\,dx \qquad x^x = t$

$\int dt = t+c = x^x+c \qquad x^x(1+\ln x)\,dx = dt$

diff.

21 $\frac{\sin x}{\sin(x-\alpha)} = A + \frac{B\cdot\cos(x-\alpha)}{\sin(x-\alpha)}$

$\sin x = A\cdot\sin(x-\alpha)+B\cos(x-\alpha)$

$= \boxed{\cos\alpha}\sin(x-\alpha)+\boxed{\sin\alpha}\cdot\cos(x-\alpha)$

$\sin x = \sin(x-\cancel{\alpha}+\cancel{\alpha})$

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29) $\int 1+\tan x \cdot \tan(x+\alpha)\, dx$

$\frac{1}{\tan\alpha}\int \tan(x+\alpha)-\tan x \cdot dx$

$1+\tan A\cdot\tan B \rightarrow \tan(A-B)$

$\tan(x-(x+\alpha)) = \frac{\tan x - \tan(x+\alpha)}{1+\tan x\cdot\tan(x+\alpha)}$

$1+\tan x\cdot\tan(x+\alpha) = \frac{\tan x-\tan(x+\alpha)}{-\tan\alpha}$

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

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

$\boxed{8}$ 1 $\frac{\int wt\, 4}{3}$

$-2\sqrt{4^2-x^2}+C$

100 ← 11,900 → 12,000

33) $\int \frac{x\, dx}{(x^2)^2+1}$ $\quad x^2=t$

34) $\int\frac{x\, dx}{\sqrt{(a)^2-(x^2)^2}}$ $\quad x^2=t$

35) $\int \frac{x^2 dx}{(x^3)^2+4}$ $\quad x^3=t$

36) $\int\frac{x^3 dx}{\sqrt{1-(x^4)^2}}$ $\quad x^4=t$

37) $\int\frac{e^x}{(e^x)^2+2^2}$ $\quad e^x=t$

38) $\int\frac{\cos x\, dx}{(a)^2+(\sin x)^2}$ $\quad \sin x=t$

39) open

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LCD, MOD

2

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

8

41) $\int \frac{2x\,dx}{x^2+9} + \frac{1}{2}\int \frac{2x-2\cdot dx}{x^2+9}$

$x^2+9=t$ $\quad +\frac{1}{2}\int \frac{2x}{x^2+9}\,dx - \int \frac{dx}{x^2+3^2}$

42) Rat & Split $\quad$ 43 $\int \frac{1-\sin x}{1-\sin^2 x}\,dx$

12) $\int \frac{e^x(1+x)}{\cos^2(x\cdot e^x)}\,dx$ $\quad x, e^x$ Jodi $=t$

$x\cdot e^x=t$

$\int \frac{dt}{\cos^2 t}$ $\quad x\cdot e^x+e^x\cdot dx=dt$

$e^x(x+1)\,dx=dt$

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

$x+\frac{1}{x}=t$

Yad

Q3 $\int \frac{\cos x\cdot dx}{\sin x-\cos x}$

Q6 $\log(x+\sqrt{x^2+1})=t$

7 $\int \frac{2x}{\sqrt{1-x^2}}$ $\quad - \int \frac{\sqrt{\sin^{-1}x}}{\sqrt{1-x^2}}$ $\quad \sin^{-1}x=t$

$1-x^2=t$

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

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

$1+e^{-x}\sin x=t$

$(e^{-x}\cos x-\sin x\cdot e^{-x})\,dx=dt$

$e^{-x}(\cos x-\sin x)\,dx=dt$

$\int \frac{dt}{t^2}$

$-\frac{1}{t}+C$

Q $\int \frac{\sec x\,dx}{\sqrt{b^2\cot^2 x-a^2\cosec^2 x}}$

$\int \frac{\sec x\cdot\tan x\,dx}{\sqrt{b^2-a^2\cdot\frac{\cosec^2 x}{\cot^2 x}}}$

$\frac{\frac{1}{s^2}}{\frac{c^2}{s^2}}$

$\int \frac{\sec x\cdot\tan x\,dx}{\sqrt{b^2-a^2\sec^2 x}}$

$\int \frac{\sec x\cdot\tan x}{\sqrt{(b)^2-(a\sec x)^2}}$

$a\sec x=t$

$a\sec x\tan x\,dx=dt$

$\frac{1}{a}\int \frac{dt}{\sqrt{(b)^2-t^2}}=\frac{1}{a}\sin^{-1}\frac{t}{b}+C$

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

$x^2e^{2\sin x}=1-t$

$1-x^2 \cdot e^{2\sin x}=t$

$0-x^2 \cdot e^{2\sin x} \cdot 2\cos x - e^{2\sin x} \cdot 2x\, dx = dt$

$-2x \cdot e^{2\sin x}(x\cos x+1)\,dx = dt$

$\frac{(x\cos x+1)\,dx}{x} = \frac{dt}{-2(x^2 \cdot e^{2\sin x})}$

$= \frac{-dt}{2(1-t)}$

$\Rightarrow \frac{1}{2}\int \frac{dt}{(t-1)\cdot(t)}$

$= \frac{1}{2} \times \frac{1}{1} \ln \frac{t}{t-1} + c$

$= \frac{1}{2} \times \ln \frac{1-x^2e^{2\sin x}}{-x^2e^{2\sin x}} + c$

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Q $\int (x^{3m}+x^{2m}+x^m)(2x^{2m}+3x^m+6)^{\frac{1}{m}}dx$ DPP4 Q8

x (om

$$\int (x^{3m-1}+x^{2m-1}+x^{m-1})\cdot(\underbrace{2x^{3m}+3x^{2m}+6x^m}_{})^{1/m}\cdot dx$$

$$2x^{3m}+3x^{2m}+6x^m=t$$

$$6m\,x^{3m-1}+6m\,x^{2m-1}+6m\,x^{m-1}\cdot dx=dt$$

$$x^{3m-1}+x^{2m-1}+x^{m-1}\,dx=\frac{dt}{6m}.$$

$$\frac{1}{6m}\int t^{1/m}\cdot dt$$

$$\frac{1}{6m}\times\frac{t^{1/m+1}}{\frac{1}{m}+1}+c$$

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$$(f^g)' = f^g\left(\frac{d}{dx}g\cdot\log f\right)$$

Q $\displaystyle\int\left(\left(\frac{x}{e}\right)^x+\left(\frac{e}{x}\right)^x\right)\ln x\cdot dx$

$$\left(\frac{x}{e}\right)^x = t$$

$$\left(\frac{x}{e}\right)^x\cdot\left(\frac{d}{dx}x\cdot\log\left(\frac{x}{e}\right)\right)dx = dt$$

$$\left(\frac{x}{e}\right)^x\left\{x\cdot\frac{1}{\left(\frac{x}{e}\right)}\cdot\frac{1}{e}\times 1+\log\frac{x}{e}\times 1\right\}dx = dt$$

$$\left(\frac{x}{e}\right)^x\left\{1+\log x-\cancel{\log e}\right\}dx = dt$$

$$\left(\frac{x}{e}\right)^x\cdot\ln x\cdot dx = dt$$

$$\ln x\cdot dx = \frac{dt}{\left(\frac{x}{e}\right)^x} = \frac{dt}{t}$$

$$\int\left(t+\frac{1}{t}\right)\frac{dt}{t}$$

$$\int\left(1+\frac{1}{t^2}\right)dt$$

$$t-\frac{1}{t}+c$$

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

Q* $\int \frac{\cos 5x + \cos 4x}{1 - 2\cos 3x} \cdot dx$

$\int \frac{2\cos\left(\frac{9x}{2}\right)\cos\left(\frac{x}{2}\right)}{1 - 2\cos 3x} \times \frac{\sin 3x}{\sin 3x} \cdot dx$

$\int \frac{2\cos\left(\frac{9x}{2}\right) \cdot \cos\frac{x}{2} \cdot \sin 3x}{\sin 3x - \sin 6x}$

$\int \frac{\cancel{2}\cancel{\cos\left(\frac{9x}{2}\right)} \cdot \cos\frac{x}{2} \cdot \sin 3x \cdot dx}{\cancel{2}\cancel{\cos\left(\frac{9x}{2}\right)} \cdot \sin\left(\frac{-3x}{2}\right)}$

$-\int \frac{\cos\frac{x}{2} \times 2\cancel{\sin\left(\frac{3x}{2}\right)} \cdot \cos\left(\frac{3x}{2}\right) dx}{\cancel{\sin\left(\frac{3x}{2}\right)}}$

$\Rightarrow -\int 2\cos\frac{3x}{2} \cdot \cos\frac{x}{2} \cdot dx$ Prod = Sum.

$\Rightarrow -\int \cos(2x) + \cos(x)\, dx$

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

Nishant Jindal

$\left(x^2+\frac{1}{x^2}\right)$ type Qs

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

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

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

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

Q $\displaystyle\int \frac{x^2+1\cdot dx}{x\sqrt{x^4+1}}$ $\to x^2$ Com.

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

ye Kiska diffⁿ hai??

$\left(x-\frac{1}{x}\right)'$

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

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

$x-1/x=t$

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

$$\int \frac{dt}{\sqrt{t^2+\sqrt{2}^2}} = \ln| \qquad |+C$$

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

$\int \frac{(1+1/x^2)\,dx}{(x^2+1/x^2-2)+2}$ है Kiska de $(x-1/x)'$

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

$(1+1/x^2)dx=dt$

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

Q. $\int \frac{(ax^2-b)\,dx}{x\sqrt{c^2x^2-(ax^2+b)^2}}$

$\underbrace{\qquad}_{x^2\,\text{com.}}$

$\int \frac{ax^2-b\cdot dx}{x^2\sqrt{c^2-(ax+\frac{b}{x})^2}}$

$\int \frac{(a-\frac{b}{x^2})dx}{\sqrt{(c)^2-(ax+\frac{b}{x})^2}}$ $ax+\frac{b}{x}=t$

$(a-\frac{b}{x^2})dx=dt.$

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

Nishant Jindal

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

x^2 com 4

3 Kiskadiff

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

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

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

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

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

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

$$\int\frac{dt}{t}=\ln\left|\tan^{-1}\left(x+\frac{1}{x}\right)\right|+c$$