



Indefinite Integrals Ex 19.9 Q5

$$\text{Let } I = \int \sqrt[3]{\cos^2 x} \sin x \, dx \text{ ----- (i)}$$

$$\begin{aligned} \text{Let } \cos x &= t & \text{then,} \\ d(\cos x) &= dt \end{aligned}$$

$$\Rightarrow -\sin x \, dx = dt$$

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

Putting  $\cos x = t$  and  $dx = -\frac{dt}{\sin x}$  in equation (i), we get

$$\begin{aligned} I &= \int \sqrt[3]{t^2} \sin x \times \frac{-dt}{\sin x} \\ &= -\int t^{\frac{2}{3}} \sin x \frac{dt}{\sin x} \\ &= -\int t^{\frac{2}{3}} dt \\ &= -\frac{3}{5} \times \frac{t^{\frac{5}{3}}}{\frac{5}{3}} + C \\ &= -\frac{3}{5} (\cos x)^{\frac{5}{3}} + C \end{aligned}$$

$$\therefore I = -\frac{3}{5} (\cos x)^{\frac{5}{3}} + C$$

Indefinite Integrals Ex 19.9 Q6

$$\text{Let } I = \int \frac{e^x}{(1+e^x)^2} dx \text{ ----- (i)}$$

$$\begin{aligned} \text{Let } 1+e^x &= t & \text{then,} \\ d(1+e^x) &= dt \end{aligned}$$

$$\Rightarrow e^x dx = dt$$

$$\Rightarrow dx = \frac{dt}{e^x}$$

Putting  $1+e^x = t$  and  $dx = \frac{dt}{e^x}$  in equation (i), we get

$$\begin{aligned} I &= \int \frac{e^x}{t^2} \times \frac{dt}{e^x} \\ &= \int \frac{dt}{t^2} \\ &= \int t^{-2} dt \\ &= -t^{-1} + C \\ &= -\frac{1}{t} + C \\ &= -\frac{1}{1+e^x} + C \end{aligned}$$

$$\therefore I = -\frac{1}{1+e^x} + C$$

Indefinite Integrals Ex 19.9 Q7

$$\text{Let } I = \int \cot^3 x \operatorname{cosec}^2 x dx \text{ ----- (i)}$$

$$\begin{aligned} \text{Let } \cot x &= t & \text{then,} \\ d(\cot x) &= dt \end{aligned}$$

$$\Rightarrow -\operatorname{cosec}^2 x dx = dt$$

$$\Rightarrow dx = -\frac{dt}{\operatorname{cosec}^2 x}$$

Putting  $\cot x = t$  and  $dx = -\frac{dt}{\operatorname{cosec}^2 x}$  in equation (i), we get

$$\begin{aligned} I &= \int t^3 \operatorname{cosec}^2 x \times \frac{-dt}{\operatorname{cosec}^2 x} \\ &= -\int t^3 dt \\ &= -\frac{t^4}{4} + C \\ &= -\frac{\cot^4 x}{4} + C \end{aligned}$$

$$\therefore I = -\frac{\cot^4 x}{4} + C$$

Indefinite Integrals Ex 19.9 Q8

$$\text{Let } I = \int \frac{\left\{e^{\sin^{-1} x}\right\}^2}{\sqrt{1-x^2}} dx \text{ ----- (i)}$$

$$\begin{aligned} \text{Let } \sin^{-1} x &= t & \text{then,} \\ d(\sin^{-1} x) &= dt \end{aligned}$$

$$\Rightarrow \frac{1}{\sqrt{1-x^2}} dx = dt$$

$$\Rightarrow dx = \sqrt{1-x^2} dt$$

Putting  $\sin^{-1} x = t$  and  $dx = \sqrt{1-x^2} dt$  in equation (i), we get

$$\begin{aligned} I &= \int \frac{\left\{e^t\right\}^2}{\sqrt{1-x^2}} \times \sqrt{1-x^2} dt \\ &= \int e^{2t} dt \\ &= \frac{e^{2t}}{2} + C \\ &= \frac{e^{2\sin^{-1} x}}{2} + C \end{aligned}$$

$$\therefore I = \frac{\left\{e^{\sin^{-1} x}\right\}^2}{2} + C$$

Indefinite Integrals Ex 19.9 Q9

$$\text{Let } I = \int \frac{1 + \sin x}{\sqrt{x - \cos x}} dx \text{ ----- (i)}$$

$$\begin{aligned} \text{Let } x - \cos x &= t & \text{then,} \\ d(x - \cos x) &= dt \end{aligned}$$

$$\Rightarrow [1 - (-\sin x)] dx = dt$$

$$\Rightarrow (1 + \sin x) dx = dt$$

Putting  $x - \cos x = t$  and  $(1 + \sin x) dx = dt$  in equation (i), we get

$$\begin{aligned} I &= \int \frac{dt}{\sqrt{t}} \\ &= \int t^{-\frac{1}{2}} dt \\ &= 2t^{\frac{1}{2}} + C \\ &= 2(x - \cos x)^{\frac{1}{2}} + C \end{aligned}$$

$$\therefore I = 2\sqrt{x - \cos x} + C$$

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