



Indefinite Integrals Ex 19.2 Q22

$$\int (\sec^2 x + \operatorname{cosec}^2 x) dx$$

$$\begin{aligned} &= \int \sec^2 x dx + \int \operatorname{cosec}^2 x dx \\ &= \tan x - \cot x + c \end{aligned}$$

$$\therefore \int (\sec^2 x + \operatorname{cosec}^2 x) dx = \tan x - \cot x + c$$

Indefinite Integrals Ex 19.2 Q23

**Evaluate the integral as follows**

$$\begin{aligned} \int \frac{\sin^3 x - \cos^3 x}{\sin^2 x \cos^2 x} dx &= \int \left( \frac{\sin^3 x}{\sin^2 x \cos^2 x} - \frac{\cos^3 x}{\sin^2 x \cos^2 x} \right) dx \\ &= \int (\sin x \sec^2 x - \cos x \operatorname{cosec}^2 x) dx \\ &= \int (\tan x \sec x - \cot x \operatorname{cosec} x) dx \\ &= \sec x + \operatorname{cosec} x + C \end{aligned}$$

Indefinite Integrals Ex 19.2 Q24

$$I \int \frac{5 \cos^3 x + 6 \sin^3 x}{2 \sin^2 x \cos^2 x} dx$$

Now,

$$\begin{aligned} I &= \int \frac{5 \cos^3 x + \sin^3 x}{2 \sin^2 x \cos^2 x} dx \\ &= \int \frac{5 \cos^3 x}{2 \sin^2 x \cos^2 x} dx + \int \frac{6 \sin^3 x}{2 \sin^2 x \cos^2 x} dx \\ &= \frac{5}{2} \int \frac{\cos x}{\sin^2 x} dx + 3 \int \frac{\sin x}{\cos^2 x} dx \\ &= \frac{5}{2} \int \cot x \operatorname{cosec} x dx + 3 \int \sec x \tan x dx \\ &= + \frac{-5}{2} \operatorname{cosec} x + 3 \sec x + c \end{aligned}$$

$$\therefore I = \frac{-5}{2} \operatorname{cosec} x + 3 \sec x + c$$

Indefinite Integrals Ex 19.2 Q25

$$\begin{aligned}
& \int (\tan x + \cot x)^2 dx \\
&= \int (\tan^2 x + \cot^2 x + 2 \tan x \cot x) dx \\
&= \int \left( \sec^2 x - 1 + \operatorname{cosec}^2 x - 1 + \frac{2 \times 1}{\cot x} \cot x \right) dx \\
&= \int (\sec^2 x + \operatorname{cosec}^2 x) dx \\
&= \int \sec^2 x dx + \int \operatorname{cosec}^2 x \\
&= \tan x - \cot x + c
\end{aligned}$$

$$\therefore \int (\tan x + \cot x)^2 = \tan x - \cot x + c$$

Indefinite Integrals Ex 19.2 Q26

$$\begin{aligned}
& \int \frac{1 - \cos 2x}{1 + \cos 2x} dx \\
&= \int \frac{2 \sin^2 x}{2 \cos^2 x} dx \\
&= \int \tan^2 x dx \\
&= \int (\sec^2 x - 1) dx \\
&= \int \sec^2 x dx - \int dx \\
&= \tan x - x + c
\end{aligned}$$

$$\therefore \int \frac{1 - \cos 2x}{1 + \cos 2x} dx = \tan x - x + c$$

Indefinite Integrals Ex 19.2 Q27

$$\begin{aligned}
& \int \frac{\cos x}{1 - \cos x} dx \\
&= \int \frac{\cos x (1 + \cos x)}{(1 - \cos x)(1 + \cos x)} dx \\
&= \int \frac{\cos x + \cos^2 x}{1 - \cos^2 x} dx \\
&= \int \frac{\cos x + \cos^2 x}{\sin^2 x} dx \\
&= \int \frac{\cos x}{\sin^2 x} dx + \int \frac{\cos^2 x}{\sin^2 x} dx \\
&= \int \cot x \times \operatorname{cosec} x dx + \int (\operatorname{cosec}^2 x - 1) dx \\
&= -\operatorname{cosec} x - \cot x - x + c
\end{aligned}$$

$$\therefore \int \frac{\cos x}{1 - \cos x} \times dx = -\operatorname{cosec} x - \cot x - x + c$$

Indefinite Integrals Ex 19.2 Q28

$$\int \frac{\cos^2 x - \sin^2 x}{\sqrt{1 + \cos 4x}} dx$$

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

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

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

$$[\because \cos 2x = \cos^2 x - \sin^2 x]$$

$$= \frac{1}{\sqrt{2}} \int 1 \times dx$$

$$= \frac{x}{\sqrt{2}} + c$$

$$\therefore \int \frac{\cos^2 x - \sin^2 x}{\sqrt{1 + \cos 4x}} \times dx = \frac{x}{\sqrt{2}} + c$$

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