



Indefinite Integrals Ex 19.8 Q1

We have,

$$\begin{aligned}\int \frac{1}{\sqrt{1 - \cos 2x}} dx &= \int \frac{1}{\sqrt{2 \sin^2 x}} dx \\&= \int \frac{1}{\sqrt{2} \sin x} dx \\&= \frac{1}{\sqrt{2}} \int \operatorname{cosec} x dx \\&= \frac{1}{\sqrt{2}} \log \left| \tan \frac{x}{2} \right| + c\end{aligned}$$

$$\therefore \int \frac{1}{\sqrt{1 - \cos 2x}} dx = \frac{1}{\sqrt{2}} \log \left| \tan \frac{x}{2} \right| + c$$

Indefinite Integrals Ex 19.8 Q2

We have,

$$\begin{aligned}\int \frac{1}{\sqrt{1 + \cos x}} dx &= \int \frac{1}{\sqrt{2 \cos^2 \frac{x}{2}}} dx \\&= \int \frac{1}{\sqrt{2} \cos \frac{x}{2}} dx \\&= \frac{1}{\sqrt{2}} \int \sec \frac{x}{2} dx \\&= \frac{1}{\sqrt{2}} \int \operatorname{cosec} \left(\frac{\pi}{2} + \frac{x}{2} \right) dx \\&= \frac{2}{\sqrt{2}} \log \left| \tan \left(\frac{\pi}{4} + \frac{x}{4} \right) \right| + c\end{aligned}$$

$$\therefore \int \frac{1}{\sqrt{1 + \cos x}} dx = \sqrt{2} \log \left| \tan \left(\frac{\pi}{4} + \frac{x}{4} \right) \right| + c$$

Indefinite Integrals Ex 19.8 Q3

Let $I = \int \sqrt{\frac{1 + \cos 2x}{1 - \cos 2x}} dx$ then,

$$\begin{aligned}I &= \int \sqrt{\frac{2 \cos^2 x}{2 \sin^2 x}} dx \\&= \int \sqrt{\cot^2 x} dx \\&= \int \cot x dx \\&= \log |\sin x| + c \quad \left[\because \int \cot x = \log |\sin x| + c \right]\end{aligned}$$

$$I = \log |\sin x| + c$$

Indefinite Integrals Ex 19.8 Q4

Let $I = \int \sqrt{\frac{1 - \cos x}{1 + \cos x}} dx$ then,

$$\begin{aligned} I &= \int \sqrt{\frac{2 \sin^2 \frac{x}{2}}{2 \cos^2 \frac{x}{2}}} dx \\ &= \int \sqrt{\tan^2 \frac{x}{2}} dx \\ &= \int \tan \frac{x}{2} dx \\ &= -2 \log \left| \cos \frac{x}{2} \right| + c \quad \left[\because \int \tan x dx = \log |\cos x| + c \right] \end{aligned}$$

$$\therefore I = -2 \log \left| \cos \frac{x}{2} \right| + c$$

Indefinite Integrals Ex 19.8 Q5

Let $I = \int \frac{\sec x}{\sec 2x} dx$, then,

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

$$\therefore I = 2 \sin x - \log |\sec x + \tan x| + c$$

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