



Indefinite Integrals Ex 19.3 Q6

Let $I = \int \frac{1}{\sqrt{2x+3} + \sqrt{2x-3}} dx$. Then,

$$\begin{aligned} I &= \int \frac{1}{\sqrt{2x+3} + \sqrt{2x-3}} \times \frac{\sqrt{2x+3} - \sqrt{2x-3}}{\sqrt{2x+3} - \sqrt{2x-3}} \times dx \\ &= \int \frac{\sqrt{2x+3} - \sqrt{2x-3}}{(\sqrt{2x+3})^2 - (\sqrt{2x-3})^2} \times dx \\ &= \int \frac{\sqrt{2x+3} - \sqrt{2x-3}}{2x+3-2x+3} \times dx \\ &= \frac{1}{6} \int (2x+3)^{\frac{1}{2}} dx - \frac{1}{6} \int (2x-3)^{\frac{1}{2}} dx \\ &= \frac{1}{6} \times \frac{(2x+3)^{\frac{3}{2}}}{\frac{3}{2} \times 2} - \frac{1}{6} \times \frac{(2x-3)^{\frac{3}{2}}}{\frac{3}{2} \times 2} + c \\ &= \frac{1}{18} \times (2x+3)^{\frac{3}{2}} - \frac{1}{18} (2x-3)^{\frac{3}{2}} + c \end{aligned}$$

$$\therefore I = \frac{1}{18} (2x+3)^{\frac{3}{2}} - \frac{1}{18} (2x-3)^{\frac{3}{2}} + c.$$

Indefinite Integrals Ex 19.3 Q7

Let $I = \int \frac{2x}{(2x+1)^2} dx$. Then,

$$\begin{aligned} I &= \int \frac{2x+1-1}{(2x+1)^2} \times dx \\ &= \int \frac{2x+1}{(2x+1)^2} \times dx - \int \frac{1}{(2x+1)^2} \times dx \\ &= \int \frac{1}{2x+1} \times dx - \int (2x+1)^{-2} \times dx \\ &= \frac{1}{2} \log|2x+1| - \frac{(2x+1)^{-1}}{-1 \times 2} + c \\ &= \frac{1}{2} \log|2x+1| + \frac{1}{2} \times \frac{1}{2x+1} + c \end{aligned}$$

$$\therefore I = \frac{1}{2} \log|2x+1| + \frac{1}{2(2x+1)} + c.$$

Indefinite Integrals Ex 19.3 Q8

Let $I = \int \frac{1}{\sqrt{x+a} + \sqrt{x+b}} dx$. Then,

$$\begin{aligned}
 I &= \int \frac{1}{\sqrt{x+a} + \sqrt{x+b}} \times \frac{\sqrt{x+a} - \sqrt{x+b}}{\sqrt{x+a} - \sqrt{x+b}} \times dx \\
 &= \int \frac{\sqrt{x+a} - \sqrt{x+b}}{x+a-x-b} \times dx \\
 &= \int \frac{\sqrt{x+a} - \sqrt{x+b}}{a-b} \times dx \\
 &= \frac{1}{a-b} \left[\frac{2}{3} (x+a)^{\frac{3}{2}} - \frac{2}{3} (x+b)^{\frac{3}{2}} \right] + c \\
 &= \frac{2}{3(a-b)} \left[(x+a)^{\frac{3}{2}} - (x+b)^{\frac{3}{2}} \right] + c
 \end{aligned}$$

$$\therefore I = \frac{2}{3(a-b)} \left[(x+a)^{\frac{3}{2}} - (x+b)^{\frac{3}{2}} \right] + c.$$

Indefinite Integrals Ex 19.3 Q9

Let $I = \int \sin \sqrt{1+c} \cos 2x \, dx$

$$\begin{aligned}
 I &= \int \sin x \times \sqrt{2 \cos^2 x} \times dx \\
 &= \int \sin x \times \sqrt{2} \times \cos x \times dx \\
 &= \sqrt{2} \int \sin x \times \cos x \times dx \\
 &= \frac{\sqrt{2}}{2} \int 2 \sin x \times \cos x \times dx \\
 &= \frac{\sqrt{2}}{2} \int \sin 2x \, dx \\
 &= \frac{\sqrt{2}}{2} \times \frac{-\cos 2x}{2} + c \\
 &= \frac{-1}{2\sqrt{2}} \times \cos 2x + c
 \end{aligned}$$

$$\therefore I = \frac{-1}{2\sqrt{2}} \times \cos 2x + c$$

Indefinite Integrals Ex 19.3 Q10

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

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

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