



Indefinite Integrals Ex 19.18 Q1

$$\begin{aligned}\text{Let } I &= \int \frac{x}{\sqrt{x^4 + a^4}} dx \\ &= \int \frac{x}{\sqrt{(x^2)^2 + (a^2)^2}} dx\end{aligned}$$

$$\text{Let } x^2 = t$$

$$\Rightarrow 2x dx = dt$$

$$\Rightarrow x dx = \frac{dt}{2}$$

$$I = \frac{1}{2} \int \frac{dt}{\sqrt{t^2 + (a^2)^2}}$$

$$= \frac{1}{2} \log \left| t + \sqrt{t^2 + (a^2)^2} \right| + c \quad \left[\text{Since } \int \frac{1}{\sqrt{x^2 + a^2}} dx = \log \left| x + \sqrt{x^2 + a^2} \right| + c \right]$$

$$I = \frac{1}{2} \log \left| x^2 + \sqrt{(x^2)^2 + (a^2)^2} \right| + c$$

$$I = \frac{1}{2} \log \left| x^2 + \sqrt{x^4 + a^4} \right| + c$$

Indefinite Integrals Ex 19.18 Q2

$$\text{Let } \tan x = t$$

$$\Rightarrow \sec^2 x dx = dt$$

$$\begin{aligned}\Rightarrow \int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx &= \int \frac{dt}{\sqrt{t^2 + 2^2}} \\ &= \log \left| t + \sqrt{t^2 + 4} \right| + C \\ &= \log \left| \tan x + \sqrt{\tan^2 x + 4} \right| + C\end{aligned}$$

Indefinite Integrals Ex 19.18 Q3

$$\text{Let } I = \int \frac{e^x}{\sqrt{16 - e^{2x}}} dx$$

$$\text{Let } e^x = t$$

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

$$I = \int \frac{dt}{\sqrt{(4)^2 - t^2}}$$

$$= \sin^{-1} \left(\frac{t}{4} \right) + c \quad \left[\text{Since } \int \frac{1}{\sqrt{a^2 - x^2}} dx = \sin^{-1} \left(\frac{x}{a} \right) + c \right]$$

$$I = \sin^{-1} \left(\frac{e^x}{4} \right) + c$$

Indefinite Integrals Ex 19.18 Q4

$$\text{Let } I = \int \frac{\cos x}{\sqrt{4 + \sin^2 x}} dx$$

$$\text{Let } \sin x = t$$

$$\Rightarrow \cos x \, dx = dt$$

$$I = \int \frac{dt}{\sqrt{(2)^2 + t^2}}$$

$$= \log \left| t + \sqrt{(2)^2 + t^2} \right| + c$$

$$\left[\text{Since } \int \frac{1}{\sqrt{a^2 + x^2}} dx = \log \left| x + \sqrt{a^2 + x^2} \right| + c \right]$$

$$I = \log \left| \sin x + \sqrt{4 + \sin^2 x} \right| + c$$

***** END *****