

Indefinite Integrals Ex 19.3 Q11

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

$$I = \int \frac{2\sin^2 \frac{x}{2}}{2\cos^2 \frac{x}{2}} \times dx$$

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

$$= \int \tan^2 \frac{x}{2} dx$$

$$= \int \left(\sec^2 \frac{x}{2} - 1\right) dx$$

$$= \frac{\tan \frac{x}{2}}{\frac{1}{2}} - x + c$$

$$= 2\tan \frac{x}{2} - x + c$$

Indefinite Integrals Ex 19.3 Q12

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

$$= \int \frac{1 + \sin \frac{x}{2}}{1 - \sin^2 \frac{x}{2}} \times dx$$

$$= \int \frac{1 + \sin \frac{x}{2}}{\cos^2 \frac{x}{2}} \times dx$$

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

$$= \int \sec^2 \frac{x}{2} dx + \int \sec \frac{x}{2} \tan \frac{x}{2} dx$$

$$= \frac{\tan \frac{x}{2}}{\frac{1}{2}} + \frac{\sec \frac{x}{2}}{\frac{1}{2}} + c$$

$$= 2 \tan \frac{x}{2} + 2 \sec \frac{x}{2} + c$$

$$\therefore I = 2 \left( \tan \frac{x}{2} + \sec \frac{x}{2} \right) + c$$

Indefinite Integrals Ex 19.3 Q13

Let 
$$I = \int \frac{1}{1 + \cos 3x} \times dx$$
. Then,  

$$I = \int \frac{1}{1 + \cos 3x} \times \frac{1 - \cos 3x}{1 - \cos 3x} \times dx$$

$$= \int \frac{1 - \cos 3x}{1 - \cos 3x} \times dx$$

$$= \int \frac{1 - \cos 3x}{\sin^2 3x} \times dx$$

$$= \int \left(\frac{1}{\sin^2 3x} - \frac{\cos 3x}{\sin^2 3x}\right) dx$$

$$= \int \left(\cos ec^2 3x - \csc 3x \cot 3x\right) dx$$

$$= \frac{-\cot 3x}{3} + \frac{\cos ec 3x}{3} + c$$

$$= \frac{-1}{3} \times \frac{\cos 3x}{\sin 3x} + \frac{1}{3} \times \frac{1}{\sin 3x} + c$$

$$= \frac{1 - \cos 3x}{3 \sin 3x} + c$$

$$\therefore I = \frac{1 - \cos 3x}{3 \sin 3x} + c$$

Indefinite Integrals Ex 19.3 Q14

Consider I=
$$\int (e^{x} + 1)^{2} e^{x} dx$$
  
let  $(e^{x} + 1) = t \rightarrow e^{x} dx = dt$   

$$I = \int (e^{x} + 1)^{2} e^{x} dx$$

$$= \int (t)^{2} dt$$

$$= \frac{t^{3}}{3} + C$$

$$= \frac{(e^{x} + 1)^{3}}{3} + C$$

Indefinite Integrals Ex 19.3 Q15

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

$$I = \int \left(e^x + \frac{1}{e^x}\right)^2 x dx$$

$$= \int \left(e^{2x} + \frac{1}{e^{2x}} + 2\right) dx$$

$$= \frac{e^{2x}}{2} - \frac{1}{2}e^{-2x} + 2x + c$$

$$\therefore I = \frac{1}{2} \times e^{2x} + 2x - \frac{1}{2} \times e^{-2x} + c$$

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