



Indefinite Integrals Ex 19.25 Q22

$$\text{Let } I = \int e^{\sqrt{x}} dx$$

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

$$x = t^2$$

$$dx = 2t dt$$

$$I = \int e^t 2t dt$$

$$I = 2 \left[t \int e^t dt - \int 1 \int e^t dt \right] dt$$

$$I = 2 \left[t e^t - \int e^t dt \right]$$

$$= 2 \left[t e^t - e^t \right] + c$$

$$= 2e^t (t - 1) + c$$

$$I = 2e^{\sqrt{x}} (\sqrt{x} - 1) + c$$

Indefinite Integrals Ex 19.25 Q23

$$\text{Let } I = \int \frac{\log(x+2)}{(x+2)^2} dx$$

$$\text{Let } \frac{1}{x+2} = t$$

$$-\frac{1}{(x+2)^2} dx = dt$$

$$I = -\int \log\left(\frac{1}{t}\right) dt$$

$$= -\int \log t^{-1} dt$$

$$= -\int 1 \times \log t dt$$

Using integration by parts,

$$I = \log t \int dt - \int \left(\frac{1}{t} \int dt \right) dt$$

$$= t \log t - \int \left(\frac{1}{t} \times t \right) dt$$

$$= t \log t - \int dt$$

$$= t \log t - t + c$$

$$= \frac{1}{x+2} (\log(x+2)^{-1} - 1) + c$$

$$I = \frac{-1}{x+2} - \frac{\log(x+2)}{x+2} + c$$

Indefinite Integrals Ex 19.25 Q24

$$\begin{aligned}
 \text{Let } I &= \int \frac{x + \sin x}{1 + \cos x} dx \\
 &= \int \frac{x}{2 \cos^2 \frac{x}{2}} dx + \int \frac{2 \sin \frac{x}{2} \cos \frac{x}{2}}{2 \cos^2 \frac{x}{2}} dx \\
 &= \frac{1}{2} \int x \sec^2 \frac{x}{2} dx + \int \tan \frac{x}{2} dx
 \end{aligned}$$

Using integration by parts,

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

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

Indefinite Integrals Ex 19.25 Q25

$$\begin{aligned}
 \text{Let } I &= \int \log_{10} x dx \\
 &= \int \frac{\log x}{\log 10} dx \\
 &= \frac{1}{\log 10} \int 1 \times \log x dx
 \end{aligned}$$

Using integration by parts,

$$\begin{aligned}
 &= \frac{1}{\log 10} \left[\log x \int dx - \int \left(\frac{1}{x} \int dx \right) dx \right] \\
 &= \frac{1}{\log 10} \left[x \log x - \int \left(\frac{x}{x} \right) dx \right] \\
 &= \frac{1}{\log 10} [x \log x - x]
 \end{aligned}$$

$$I = \frac{x}{\log 10} (\log x - 1)$$

Indefinite Integrals Ex 19.25 Q26

$$\begin{aligned}
 \text{Let } I &= \int \cos \sqrt{x} dx \\
 \sqrt{x} &= t \\
 x &= t^2 \\
 dx &= 2t dt \\
 &= \int 2t \cos t dt \\
 I &= 2 \int t \cos t dt \\
 I &= 2 \left[t \int \cos t dt - \int (1) \cos t dt \right] dt \\
 &= 2 \left[t \sin t - \int \sin t dt \right] \\
 &= 2 \left[t \sin t + \cos t \right] + c
 \end{aligned}$$

$$I = 2 \left[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x} \right] + c$$

Indefinite Integrals Ex 19.25 Q27

$$\text{Let } I = \int \frac{x \cos^{-1} x}{\sqrt{1-x^2}} dx$$

Let us substitute, $t = \cos^{-1} x$

$$\Rightarrow dt = \frac{-1}{\sqrt{1-x^2}} dx$$

Also, $\cos t = x$

Thus,

$$I = - \int t \cos t dt$$

Now let us solve this by the 'by parts' method.

Let $u = t$; $du = dt$

$$\int \cos t dt = \int dv$$

$$\Rightarrow \sin t = v$$

$$\text{Thus, } I = - \left[t \sin t - \int \sin t dt \right]$$

$$\Rightarrow I = - \left[t \sin t + \cos t \right] + C$$

Substituting the value $t = \cos^{-1} x$, we have,

$$I = - \left[\cos^{-1} x \sin t + x \right] + C$$

$$\Rightarrow I = - \left[\cos^{-1} x \sqrt{1-x^2} + x \right] + C$$

***** END *****