



Indefinite Integrals Ex 19.25 Q1

Let $I = \int x \cos x \, dx$

Using integration by parts,

$$\begin{aligned} I &= x \int \cos x \, dx - \int (1 \times \int \cos x \, dx) \, dx + c \\ &= x \sin x - \int \sin x \, dx + c \end{aligned}$$

$$I = x \sin x + \cos x + c$$

Indefinite Integrals Ex 19.25 Q2

Let $I = \int \log(x+1) \, dx$
 $= \int 1 \times \log(x+1) \, dx$

Using integration by parts,

$$\begin{aligned} I &= \log(x+1) \int 1 \, dx - \int \left(\frac{1}{x+1} \times \int 1 \, dx \right) \, dx + c \\ &= x \log(x+1) - \int \left(\frac{x}{x+1} \right) \, dx + c \\ &= x \log(x+1) - \int \left(1 - \frac{1}{x+1} \right) \, dx + c \end{aligned}$$

$$I = x \log(x+1) - x + \log(x+1) + c$$

Indefinite Integrals Ex 19.25 Q3

Let $I = \int x^3 \log x \, dx$

Using integration by parts,

$$\begin{aligned} I &= \log x \int x^3 \, dx - \int \left(\frac{1}{x} \times \int x^3 \, dx \right) \, dx + c \\ &= \frac{x^4}{4} \log x - \int \frac{x^4}{4x} \, dx + c \\ &= \frac{x^4}{4} \log x - \frac{1}{4} \int x^3 \, dx + c \\ &= \frac{x^4}{4} \log x - \frac{1}{4} \int \frac{x^4}{4} \, dx + c \end{aligned}$$

$$I = \frac{x^4}{4} \log x - \frac{1}{16} x^4 + c$$

Indefinite Integrals Ex 19.25 Q4

Take first function as x and second function as e^x . The integral of the second function is e^x .
 Therefore, $\int x e^x \, dx = x e^x - \int 1 \cdot e^x \, dx = x e^x - e^x + C$.

Indefinite Integrals Ex 19.25 Q5

Let $I = \int x e^{2x} dx$

Using integration by parts,

$$\begin{aligned} I &= x \int e^{2x} dx - \int (1 \times \int e^{2x} dx) dx + c \\ &= \frac{x e^{2x}}{2} - \int \left(\frac{e^{2x}}{2} \right) dx + c \\ &= \frac{x e^{2x}}{2} - \frac{e^{2x}}{4} + c \end{aligned}$$

$$I = \left(\frac{x}{2} - \frac{1}{4} \right) e^{2x} + c$$

Indefinite Integrals Ex 19.25 Q6

Let $I = \int x^2 e^{-x} dx$

Using integration by parts,

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

Indefinite Integrals Ex 19.25 Q7

Let $I = \int x^2 \cos x dx$

Using integration by parts,

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

***** END *****