Image

$$
\begin{aligned}
& \text { 1. } \int 2 x^{2} \ln x d x \\
& u=\ln x \\
& \frac{d u}{d x}=\frac{1}{x}, d y=\frac{1}{x} d x \\
& d v=2 x^{2} d x \\
& \begin{aligned}
\int d v & =\int 2 x^{2} d x \\
v & =\frac{x^{3}}{3}
\end{aligned} \\
& \begin{aligned}
\int d v & =\int 2 x^{2} d x \\
v & =\frac{2 x^{3}}{3}
\end{aligned} \\
& \begin{array}{l}
\int u d v=u v \cdot \int v d u \\
\int 2 x^{2} \ln x d x=\frac{2}{3} x^{3} \ln x-\frac{2}{3} \int x^{2} d x
\end{array} \\
& \begin{array}{l}
\int u d v=u v \cdot \int v d u \\
\int 2 x^{2} \ln x d x=\frac{2}{3} x^{3} \ln x-\frac{2}{3} \int x^{2} d x
\end{array} \\
& =\frac{2}{3} x^{2} \ln x-\frac{2}{3} \cdot \frac{x^{3}}{3}+c \quad 3 \\
& =\frac{2}{3} x^{3} \ln x-\frac{2 x^{3}}{4}+c \\
& \therefore \int 2 x^{2} \ln x d x=\frac{2}{3} x^{3}\left(\ln x-\frac{1}{3}\right)+c \\
& \text { Solution }
\end{aligned}
$$

2. $\int 3 t e^{-2 t} d t$

$$
\begin{aligned}
& u=3 t \\
& \frac{d y}{d t}=3, d u=3 d t \\
& d v=e^{2 t} d t \\
& v=\frac{e^{2 t}}{2}
\end{aligned}
$$

$$
\therefore \int 3 t e^{2 t} d t=\frac{3}{2} e^{2 t}\left(t-\frac{1}{2}\right)+c
$$

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3 .
$$

$\int x^{2} \sin x d x$
$y=$ Solution

$$
\begin{aligned}
& u=x^{2} \\
& d u=2 x d x \\
& d v=\sin x d x \\
& v=-\cos x
\end{aligned}
$$

$$
\begin{aligned}
& \int u d s=u d-\int \sqrt{d} d y \\
& \int x^{2} \sin x d x=-x^{2} \cos x-\int(-\cos x)(2 x d x) \\
& \therefore \int x^{2} \sin x d x=-x^{2} \cos x+2 \int x \cos x d x
\end{aligned}
$$

$$
\text { bat } \int x \cos x d x=\text { ? }
$$

$$
\begin{aligned}
& \int 3+e^{3 t} d t=\frac{3 t}{2}\left(e^{t t}\right)-\frac{3}{2} \int e^{2 t} d t \\
& \int 4 d v=u v-\int v d u \\
& =3 t\left(e^{2 t}\right)-\frac{3}{2} \frac{e^{2 t}}{2}+c \\
& \int 3+e^{2 t} d t=\frac{3 t}{2}\left(e^{2 t}\right)-\frac{3}{4} e^{3 t}+c
\end{aligned}
$$

$$
\begin{aligned}
& \int x \cos x d x \\
& u=x \\
& d u=d x \\
& d v=\cos x d x \\
& V=\sin x \text {. } \\
& \int x \cos x d x=x \sin x-\int \sin x d x \\
& \therefore \int \cos 5 x \cos 6 x d x=\frac{\sin 11 x}{22}+\frac{\sin x}{2}+c \\
& =x \sin x-(-\cos x) \\
& \sin 7 x \cos 2 x=\frac{1}{2}[\sin 9 x+\sin 5 x] \\
& =x \sin x+\cos x \\
& 5 \int \sin 7 x \cos 2 x d x \\
& \text { Solution } \\
& \therefore \int x^{2} \sin x d x=-x^{2} \cos x+2(x \sin x+\cos x)+c \\
& \int x^{2} \sin x d x=-x^{2} \cos x+2 x \sin x+2 \cos x+c \\
& =\frac{1}{2}\left[\frac{-\cos n}{9}-\frac{\cos 5 x}{5}\right]+C \\
& 4 \int \cos 5 x \cos 6 x d x \\
& =\frac{-\cos 9 x}{18}-\frac{\cos 5 x}{18}+c \\
& \operatorname{Cos} A \operatorname{Cos} B=\frac{1}{2}[\operatorname{Cos}(A+B)+\cos (A-B)] \\
& A=5 x \quad B=6 x \\
& \cos 5 x \cos 6 x=\frac{1}{2}[\cos (5 x+6 x)+\cos (5 x-6 x)] \\
& \therefore \int \sin x \cdot \cos 2 x d x= \\
& \begin{array}{l}
=\frac{1}{2}[\cos 4 x+\cos (-x)] \\
=\cos (-x)=\cos x \\
=\frac{1}{2}[\cos 1 x+\cos x]
\end{array} \\
& \begin{array}{l}
=\frac{1}{2}[\cos 4 x+\cos (-x)] \\
=\cos (-x)=\cos x \\
=\frac{1}{2}[\cos 11 x+\cos x]
\end{array} \\
& \begin{array}{l}
=\frac{1}{2}[\cos 4 x+\cos (-x)] \\
=\cos (-x)=\cos x \\
=\frac{1}{2}[\cos 11 x+\cos x]
\end{array} \\
& \begin{aligned}
\int \cos 5 x 4 x-\frac{1}{2} d x & =\frac{1}{2} \int(\cos 11 x+\cos x) d x \\
& =\frac{1}{2}\left(\frac{\sin 11 x}{11}+\frac{\sin x}{1}\right)+c
\end{aligned} \\
& =\frac{-\cos ^{9} 9 x}{18}-\frac{\cos 5 x}{10}+c
\end{aligned}
$$

