Examples)

$\int x^2 e^x \, dx.$ $\qquad\qquad$ $\int e^x \sin 2x \, dx.$

$u' \to u \quad | \quad dv \quad \leftarrow \int dv$

u	dv
x^2	e^x
$2x$	e^x
2	e^x
0	e^x

u	dv
e^x	$\sin 2x$
e^x	$-\frac{1}{2}\cos 2x$
e^x	$-\frac{1}{4}\sin 2x$

$\Rightarrow \int x^2 e^x \, dx = \boxed{x^2 e^x - 2xe^x + 2e^x + c}$

$\boxed{\int e^x \sin 2x \, dx} = -\frac{1}{2}e^x \cos 2x + \frac{1}{4}e^x \sin 2x$

$\qquad\qquad\qquad -\frac{1}{4}\boxed{\int e^x \sin 2x \, dx}$

$+\frac{1}{4}\int$

$\frac{4}{5} \cdot \frac{5}{4}\boxed{\int e^x \sin 2x \, dx} = \left(-\frac{1}{2}e^x \cos 2x + \frac{1}{4}e^x \sin 2x\right)\frac{4}{5}$

$\int e^x \sin 2x \, dx = \boxed{-\frac{1}{5}e^x \cos 2x + \frac{1}{5}e^x \sin 2x + C}$

#10.

$$\int x \, \arcsin x^2 \, dx$$

$$u = x^2 \qquad du = 2x \, dx$$

$$\tfrac{1}{2} du = x \, dx$$

$$\tfrac{1}{2} \int \arcsin w \, dw$$

$$
\begin{array}{c|c}
U = \arcsin w & dv = dw \\
du = \dfrac{1}{\sqrt{1-w^2}} \, dw & \oplus \\
& v = w
\end{array}
$$

$$\ominus \int$$

$$\Rightarrow \tfrac{1}{2}\left[w \arcsin w - \int \frac{w}{\sqrt{1-w^2}} \, dw \right]$$

$$u = 1 - w^2$$

$$du = -2w \, dw.$$

$$\left(-\tfrac{1}{2}\right) du = w \, dw$$

$$= \tfrac{1}{2}\left[w \arcsin w + \tfrac{1}{2} \int \frac{1}{\sqrt{u}} \, du \right]$$

$$= \tfrac{1}{2}\left[w \arcsin w + \tfrac{1}{2} \int u^{-\frac{1}{2}} \, du \right]$$

$$= \tfrac{1}{2}\left[w \arcsin w + \sqrt{u} \right] + C$$

$$= \tfrac{1}{2}\left[x^2 \arcsin x^2 + \sqrt{1 - (x^2)^2} \right] + C$$