

Examples)

①

$$\int x^2 e^x dx.$$

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

x^2	e^x
$2x$	e^x
2	e^x
0	e^x

Red annotations: A diagonal line separates the two columns. Signs $\oplus, \ominus, \oplus, \ominus$ are written between the rows. A red arrow points from the 2 row to the 0 row. A red circle with a minus sign is at the bottom.

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

u	dv
e^x	$\oplus \sin 2x$
e^x	$\ominus \frac{1}{2} \cos 2x$
e^x	$\oplus \frac{1}{4} \sin 2x$
	$\oplus \int$

$$\Rightarrow \int x^2 e^x dx = x^2 e^x - 2x e^x + 2e^x + C$$

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

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

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

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

#10.

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

$$u = x^2 \quad du = 2x dx.$$

$$\frac{1}{2} du = x dx$$

$$\frac{1}{2} \int \arcsin u du$$

$u = \arcsin w.$	$du = dw$
$du = \frac{1}{\sqrt{1-w^2}} dw$	$v = w$

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

$$u = 1 - w^2$$

$$du = -2w dw.$$

$$-\frac{1}{2} du = w dw$$

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

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

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

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