Ex $\int x^2 \cos 3x \, dx$ Works out Perfectly!!

D	I
$+ x^2$	$\cos 3x$
$- 2x$	$\frac{1}{3}\sin 3x$
$+ 2$	$-\frac{1}{9}\cos 3x$
$- 0$	$-\frac{1}{27}\sin 3x$

$$\int x^2 \cos 3x \, dx = \frac{x^2 \sin 3x}{3} + \frac{2x \cos 3x}{9} - \frac{2 \sin 3x}{27}.$$

Ex $\int e^x \cos x \, dx$ "Stop when it starts to repeat"
- You should get a Matching Term

D	I
$+ e^x$	$\cos x$
$- e^x$	$\sin x$
$+ e^x$	$-\cos x$

$\leftarrow \int$

$$1\int e^x \cos x \, dx = e^x \sin x + e^x \cos x - 1\int e^x \cos x \, dx$$

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

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

Ex) $\int x^3 \ln x \, dx$ "Stop when it starts to get smaller"

D	I
$+\ln x$	x^3
$-\frac{1}{x}$	$\frac{1}{4}x^4$
$\int$	
x^2	

$$\int x^3 \ln x \, dx = \frac{x^4 \ln x}{4} - \int \frac{x^4}{4} \cdot \frac{1}{x} \, dx$$

$$= \frac{x^4 \ln x}{4} - \frac{1}{4}\int x^3 \, dx$$

$$= \frac{x^4 \ln x}{4} - \frac{1}{4} \cdot \frac{1}{4}x^4 + C$$

$$= \frac{x^4 \ln x}{4} - \frac{x^4}{16} + C$$

Ex) $\int e^{2x} \cos x \, dx$ "Stop when you get a Matching Term"

D	I
$+e^{2x}$	$\cos x$
$-2e^{2x}$	$\sin x$
$+4e^{2x}$	$-\cos x$
	$\int$

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

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

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

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