Integración por partes

* Integración Tabular

$$\int x^3 \cos 3x \, dx \qquad \left\lceil \int u \, dv = uv - \int v \, du \right\rceil$$

Sea $\int [f(x) \cdot g(x)] dx$, si°

$$f(x) \qquad\qquad g(x)$$

Se puede derivar hasta hacerce (cero)

Se puede Integrar succesivamente

Entonces

$f(x)$ (+) $g(x)$

$f'(x)$ (-) $\int g(x) \, dx$

$f''(x)$ (+) $\int\int g(x) \, dx \, dx$

$\vdots$ $\int\int\int g(x) \, dx \, dx \, dx$

$\emptyset$ $\vdots$

Derivar		Integrar
$f(x) = x^3$	(+)	$g(x) = \cos(3x)$
$f'(x) = 3x^2$	(-)	$\int g(x) dx = \dfrac{1}{3} \operatorname{sen}(3x)$
$f''(x) = 6x$	(+)	$\int\int g(x) \, dx \, dx = -\dfrac{1}{9} \cos(3x)$
$f'''(x) = 6$	(-)	$\int\int\int g(x) \, dx \, dx \, dx = -\dfrac{1}{27} \operatorname{sen}(3x)$
$f^{\circ}(x) = 0$		$\int\int\int\int g(x) \, dx \, dx \, dx \, dx = \dfrac{1}{81} \cos(3x)$

$$* \; \frac{d}{dx} x^n = n x^{n-1} \qquad * \int \operatorname{sen}(x) \, dx = -\cos(x) + c$$

$$* \int \cos(x) \, dx = \operatorname{sen}(x) + c$$

$$= \frac{x^3 \operatorname{sen}(3x)}{3} + 3x^2 \frac{1}{9} \cos(3x) - 6x \frac{1}{27} \operatorname{sen}(3x)$$

$$- 6 \frac{1}{81} \cos(3x) + C$$

$$\int x^3 \cos 3x \, dx = \frac{x^3 \operatorname{sen}(3x)}{3} + \frac{x^2 \cos(3x)}{3} - \frac{2x \operatorname{sen}(3x)}{9}$$

$$- \frac{2 \cos(3x)}{27} + C$$