Tabular Method

A process of integration by parts that only uses u and dv.

The variable u must be a function whose nth derivative will equal zero.

For instance:

$f(x) = x^2$

$f'(x) = 2x$

$f''(x) = 2$

$f'''(x) = 0$

The remaining parts of the function become *dv*.

Applying tabular method

1. Set up a table
2. The table will consist of three columns.
3. The first column will indicate the sign.
4. The second will indicate u and it's derivatives.
5. The third will indicate *dv* and its antiderivatives.

Ex:

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

sign	u and it's derivatives	v' and it's anti-derivatives
+	x^2	$\sin x$
−	$2x$	$-\cos x$
+	2	$-\sin x$
−	0	$\cos x$

$\int x^2 \sin x \, dx = -x^2 \cos x + 2x \sin x + 2 \cos x + C$

http://www.kent.k12.wa.us/staff/david.wright/Calculus/book/72/index.html

www.math.washington.edu/~hubenjm/tabular.pdf

Tabular Method for Integration by parts

Example 1 Evaluate $\int x^2 \cos x \, dx$

D		I
x^2	$+$ ↘	$\cos x$
$2x$	$-$ ↘	$\sin x$
2	$+$ ↘	$-\cos x$
0		$-\sin x$

$$\begin{aligned}\int x^2 \cos x \, dx &= x^2 \sin x - 2x(-\cos x) + 2(-\sin x) + C \\ &= x^2 \sin x + 2x \cos x - 2 \sin x + C\end{aligned}$$

Example 2 Evaluate $\int (x^3 + 2x)\, e^{2x} \, dx$

D		I
$x^3 + 2x$	$+$ ↘	e^{2x}
$3x^2 + 2$	$-$ ↘	$e^{2x}/2$
$6x$	$+$ ↘	$e^{2x}/4$
6	$-$ ↘	$e^{2x}/8$
0		$e^{2x}/16$

$$\begin{aligned}\int (x^3 + 2x)\, e^{2x} \, dx &= \frac{x^3 + 2x}{2} e^{2x} - \frac{(3x^2 + 2)}{4} e^{2x} + \frac{6x}{8} e^{2x} - \frac{6}{16} e^{2x} + C \\ &= \frac{e^{2x}}{8}(4x^3 - 6x^2 + 14x - 7) + C\end{aligned}$$

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