

Ex: $\int x^2 \sin 4x \, dx$

Let $u = x^2$ and $dv = v' \, dx = \sin 4x \, dx$. Create a table consisting of three columns, as follows.

Alternative Signs	u and Its Derivatives	v' and Its Antiderivatives
+	$\longrightarrow x^2$	$\sin 4x$
-	$\longrightarrow 2x$	$-\frac{1}{4} \cos 4x$
+	$\longrightarrow 2$	$-\frac{1}{16} \sin 4x$
-	$\longrightarrow 0$	$\frac{1}{64} \cos 4x$
	\uparrow Differentiate until you obtain 0 as a derivative.	

The solution is obtained by adding the *signed* products of the diagonal entries:

$$\int x^2 \sin 4x \, dx = -\frac{1}{4}x^2 \cos 4x + \frac{1}{8}x \sin 4x + \frac{1}{32} \cos 4x + C.$$