

Formula:

 Guidelines for choosing u and dv :

LIATE

Integral	u =	dv =
$\int x^3 \ln x \, dx$	$\ln x$	$x^3 \, dx$
$\int \sin x \ln \cos x \, dx$		
$\int x^2 \cos x \, dx$		
$\int 3x e^{-x} \, dx$		
$\int e^x \tan x \, dx$		

If LIATE does not work:

- Let dv be the most complicated portion of the integrand AND the one you know how to integrate
- Let u be that portion of the integrand whose derivative du is a simpler function than u itself

$$\int x^4 \sqrt{2-x^3} \, dx$$

 If we choose $u = x^4$ and $dv = \sqrt{2-x^3} \, dx$ we wouldn't know how to integrate dv .

However, from the section on integration by substitution, we would know how integrate the following

$$\int x^{\boxed{}} \sqrt{2-x^3} \, dx$$

This means that for our integration by parts we need,

$$u = \boxed{}, \quad dv = \boxed{}$$

Using integration by parts several times:

Important

DO NOT switch choices for u and dv in successive applications

Example: $\int x^2 \cos x \, dx$

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

$$dv = \cos x \, dx, \quad v = \sin x$$

Applying the integration by parts formula:

$$\int x^2 \cos x \, dx = \boxed{} - \int \boxed{} \, dx$$

To solve the last integral we need to apply integration by parts one more time,

Right choice:

$$u = \boxed{}$$

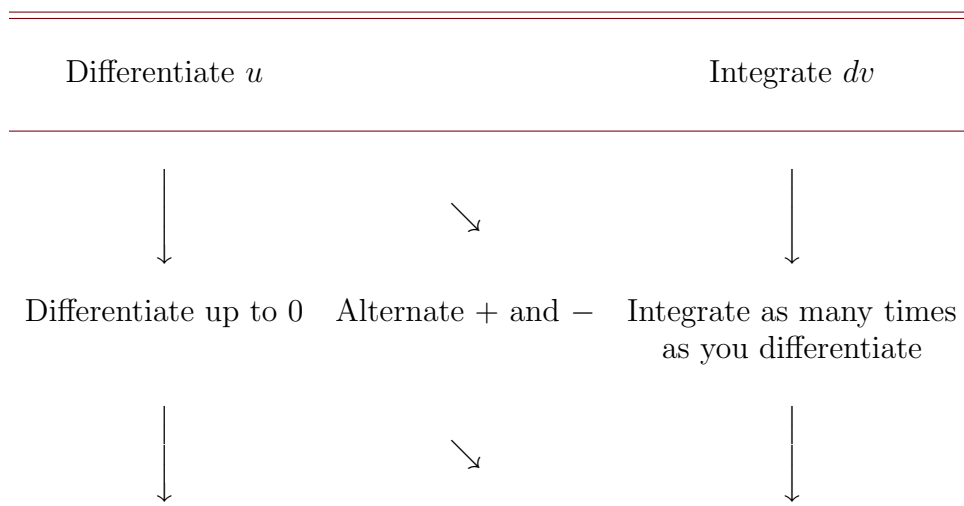
$$dv = \boxed{}$$

Wrong choice:

$$u = \boxed{}$$

$$dv = \boxed{}$$

Example: $\int x^5 e^{3x} dx$



Example: $\int e^x \sin(2x) dx$

$$u = \boxed{} \quad du = \boxed{}$$

$$dv = \boxed{} \quad v = \boxed{}$$

One integration by parts:

$$\int e^x \sin(2x) dx = \boxed{} - \int \boxed{} dx$$

To solve the last integral we should have

$$u = \boxed{} \quad du = \boxed{}$$

$$dv = \boxed{} \quad v = \boxed{}$$

so that the second integration by parts gives:

$$\int e^x \sin(2x) dx = \boxed{} - \boxed{} + \int \boxed{}$$

$$\int e^x \sin(2x) dx = \boxed{} - \boxed{} + \int \boxed{} e^x \sin(2x) dx$$