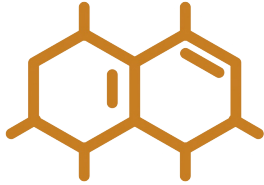


# Integrales por Partes

$$\mu \cdot v - \int v \, d\mu$$



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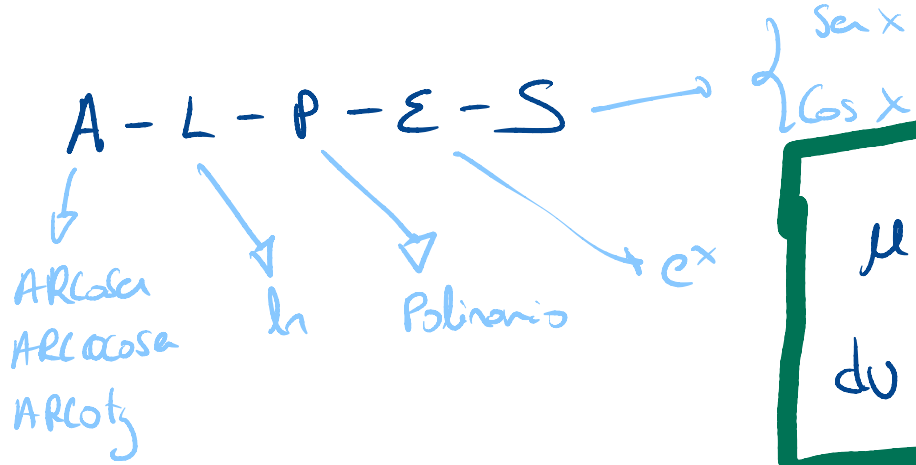
①  $\int x \cdot \cos(x) \, dx$

→ Tenemos dos cosas multiplicadas  
 y no se puede hacer de la  
 forma "CASI-INMEDIATA".



$\mu \rightarrow$  Derivar

$dv \rightarrow$  integrar



$$\mu = x \xrightarrow{\Delta} d\mu = 1 \, dx$$

$$dv = \cos(x) \, dx \xrightarrow{\pm} v = \sin x$$

$$= x \cdot \sin(x) - \int \sin x \, dx = x \cdot \sin(x) - (-\cos(x))$$

$$= x \cdot \sin(x) + \cos(x) + c$$

$$\textcircled{2} \int x^2 \cdot \sec(x) dx$$

$$\mu = x^2 \xrightarrow{D} d\mu = 2x dx$$
$$d\theta = \sec(x) dx \xrightarrow{I} \theta = -\cos(x)$$

$$= x^2 \cdot (-\cos(x)) - \int -\cos(x) \cdot 2x dx$$

$$= -x^2 \cdot \cos(x) + 2 \int \cos(x) \cdot x dx$$

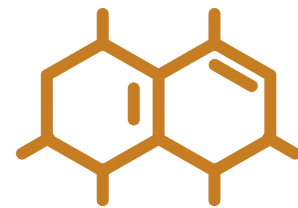
$$\mu = x \xrightarrow{D} d\mu = 1 dx$$
$$d\theta = \cos(x) dx \xrightarrow{I} \theta = \sin(x)$$

Volvemos a hacer  
otra vez el método  
de "Por Partes"

$$= -x^2 \cdot \cos(x) + 2 \cdot \left[ x \cdot \sin(x) - \int \sin(x) \cdot 1 dx \right]$$

$$= -x^2 \cdot \cos(x) + 2 \cdot \left[ x \cdot \sin(x) - (-\cos(x)) \right]$$

$$= -x^2 \cdot \cos(x) + 2 \cdot \left[ x \cdot \sin(x) + \cos(x) \right] + C$$



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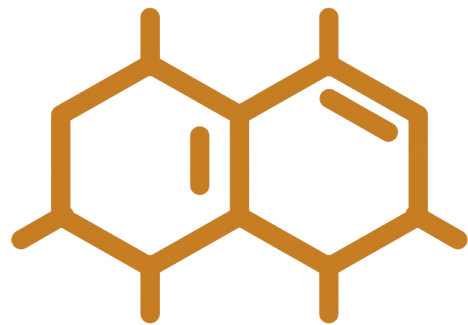
$$\textcircled{3} \int x^2 \cdot \ln(x) dx$$

$$= \ln(x) \cdot \frac{x^3}{3} - \int \frac{x^3}{3} \cdot \frac{1}{x} dx$$

$$= \ln(x) \cdot \frac{x^3}{3} - \frac{1}{3} \cdot \int x^2 dx = \ln(x) \cdot \frac{x^3}{3} - \frac{1}{3} \cdot \frac{x^3}{3}$$

$$= \frac{x^3 \ln(x)}{3} - \frac{x^3}{9} + C$$

$$\begin{aligned} u &= \ln(x) \xrightarrow{d} du = \frac{1}{x} dx \\ dv &= x^2 dx \xrightarrow{I} v = \frac{x^3}{3} \end{aligned}$$

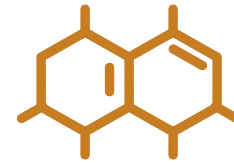


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4

$$\int e^x \cdot \sec(x) dx$$

$$\begin{aligned} \mu &= e^x \xrightarrow{d} d\mu = e^x dx \\ dv &= \sec(x) dx \xrightarrow{I} v = -\cos(x) \end{aligned}$$



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$$= e^x \cdot (-\cos(x)) - \int (-\cos(x)) \cdot e^x dx$$

$$= -e^x \cdot \cos(x) + \int \cos(x) \cdot e^x$$

$$\begin{aligned} \mu &= e^x \xrightarrow{d} d\mu = e^x dx \\ dv &= \cos(x) dx \xrightarrow{I} v = \sin(x) \end{aligned}$$

$$= -e^x \cdot \cos(x) + \left[ e^x \cdot \sin(x) - \int \sec(x) \cdot e^x dx \right]$$

→ ES la integral original

↓  
Se trata de una

Integral CÍCLICA

$$I = -e^x \cdot \cos(x) + e^x \cdot \sin(x) - I$$



$$I = \int \sec(x) \cdot e^x dx$$

$$2I = -e^x \cdot \cos(x) + e^x \cdot \sin(x)$$

$$I = \frac{e^x \cdot (-\cos(x) + \sin(x))}{2} + C$$

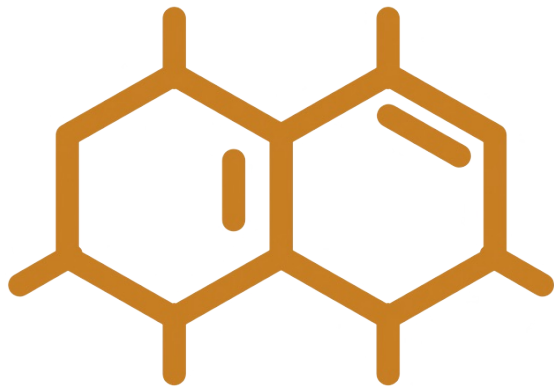


$$\textcircled{5} \int e^x \cdot x \, dx$$



$$\begin{aligned} u = x &\xrightarrow{d} du = dx \\ dv = e^x &\xrightarrow{I} v = e^x \end{aligned}$$

$$x \cdot e^x - \int e^x \cdot 1 \, dx = x \cdot e^x - e^x = e^x \cdot (x - 1) + C$$



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6)  $\int \ln(x) \cdot 1 \, dx$  → DITRUCO! → Para convertirlo a una por partes

$$\begin{aligned} u = \ln x &\xrightarrow{d} du = \frac{1}{x} dx \\ dv = 1 dx &\xrightarrow{I} v = x \end{aligned}$$



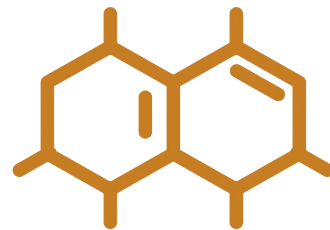
$$= \ln(x) \cdot x - \int \cancel{x} \cdot \frac{1}{\cancel{x}} dx$$

$$= \ln(x) \cdot x - \int 1 dx$$

$$= \ln(x) \cdot x - x$$

FC

$$= \frac{x \cdot (\ln(x) - 1) + C}{\text{~~~~~}}$$



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