INTEGRALI PER PARTI

M5037

$\int x \sin x \, dx$ HANNO FORMA MISTA TRASCENDENTE E POLINOMIO

$$\int u'v = uv - \int u v'$$

derivata

non derivata

ESEMPIO $\int x \sin x \, dx$

CASO 1)

$x = u'$

$\sin x = v$

$\frac{x^2}{2} = u$

$\cos x = v'$

applico la formula $= \frac{x^2}{2} \cdot \sin x - \int \frac{x^2}{2} \cos x \, dx$

caso 2) $\sin x = u'$

$-\cos x = u$

$x = v$

$1 = v'$

applico la formula

$= -\cos x \cdot x - \int 1 \cdot (-\cos x)\, dx$

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

- $\int \underset{v}{x}\, \underset{u'}{e^x}\, dx$

$u = e^x$

$u' = e^x$

$v = x$

$v' = 1$

$uv - \int v'u \rightarrow xe^x - \int 1 \cdot e^x = xe^x - e^x + C$

- $\int \underset{v}{4x}\ \underset{u'}{e^{2x}}\,dx$

$u = \frac{1}{2}e^{2x}$

$u' = e^{2x}$

$v = 4x$

$v' = 4$

$\frac{1}{2}\int 2e^{2x}\,dx = \frac{1}{2}e^{2x} + C$

$\frac{1}{2}e^{2x}\cdot 4x - \int 4\cdot\frac{1}{2}e^{2x}\,dx =$

$\frac{1}{2}e^{2x}\cdot 4x - \int 2e^{2x}\,dx = 2xe^{2x} - e^{2x} + C$

$= e^{2x}(2x-1) + C$

- $\int \underset{v}{1}\cdot\underset{u'}{\ln x}\,dx$

$u' = \ln x$

$u = \int \ln x$ OPS!

$v' = 0$

$v = 1$

$$\int \underset{u'}{1} \cdot \underset{v}{\ln x}\, dx$$

$u' = 1$

$u = x$

$v' = \frac{1}{x}$

$v = \ln x$

$$= x \cdot \ln x - \int x \cdot \frac{1}{x} dx = x \ln x - x + C$$

FACCIO LA DERIVATA $= 1 \cdot \ln x + x \cdot \frac{1}{x} - 1$