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Calculo II

Ciencias da Computação

$$\int_0^1 \frac{2x}{1+x^2}\,dx = \int \frac{2x}{1+x^2}\,dx = \int \frac{\cancel{2}x}{1+x^2}\cdot\frac{1}{\cancel{2}x}\,dt = \int \frac{x}{1+x^2}\cdot\frac{1}{x}\,dt$$

$$\int \frac{1}{1+x^2}\,dt = \int \frac{1}{t}\,dt$$

$$\ln(1+x^2)\Big|_0^1 = \ln(1+1^2) - \ln(1+0^2) = \underline{\ln(2)}$$

$$\int_0^1 \frac{1}{1+t^2}\,dt = \int \frac{1}{1+t^2}\,dt = \int \frac{1}{t^2+1^2} = \frac{1}{1}\cdot \arctan\left(\frac{t}{1}\right)$$

$$\arctan(t)\Big|_0^1 = \arctan(1) - \arctan(0) = \underline{\frac{\pi}{4}}$$

$$\int_1^3 \left(1+\frac{1}{x}\right)dx = \int 1+\frac{1}{x}\,dx = \int 1\,dx + \int \frac{1}{x}\,dx$$

$$x+\ln(x) = (x+\ln(x))\Big|_1^3 = 3+\ln(3)-(1+\ln(1))$$

$$= \underline{2+\ln(3)}$$

$$\int_0^1 \frac{x^2}{(1+x^3)^2}\,dx = \int \frac{x^2}{(1+x^3)^2}\,dx = \int \frac{1}{3t^2}\,dt = \frac{1}{3}\cdot\int \frac{1}{t^2}\,dt$$

$$= \frac{1}{3}\cdot\left(-\frac{1}{t}\right) = \frac{1}{3}\cdot\left(-\frac{1}{1+x^3}\right) = -\frac{1}{3+3x^3} = -\frac{1}{3+3x^3}\Big|_0^1$$

$$= -\frac{1}{3+3\cdot 1^3} - \left(-\frac{1}{3+3\cdot 0^3}\right) = \underline{\frac{1}{6}}$$

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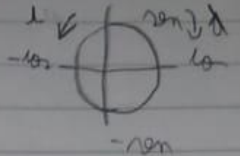
$\int e^x \cos x \, dx$ ($e^x \to u$, $\cos x \, dx \to dv$)

$$\int u \, dv = uv - \int v \, du$$

$\frac{du}{dx} = e^x \rightarrow du = e^x \, dx$

$u = e^x$
$du = e^x \, dx$
$v = \operatorname{sen} x$
$dv = \cos x$



$$\int e^x \cos x \, dx = e^x . \operatorname{sen} x - \int \operatorname{sen} x . e^x \, dx$$

$$\int \cos x \, dx = e^x \operatorname{sen} x - e^x \int \operatorname{sen} x \, dx = \boxed{e^x . \operatorname{sen} x - e^x \cos x + K}$$

$\int x \operatorname{sen} x \, dx =$

$u = x$
$dv = \operatorname{sen}(x) dx$
$du = dx$
$v = -\cos(x)$

$x . (-\cos(x)) - \int -\cos(x) \, dx$
$-x . \cos(x) + \int \cos(x) dx$
$-x \cos(x) + \operatorname{sen}(x)$
$\boxed{-x . \cos(x) + \operatorname{sen}(x) + C, \; C \in R}$