Intégration par parties

▪ Calculer les intégrales définies et indéfinies suivantes

$$\int_0^1 e^{-x}\, x\, dx$$

$$\int x \sin(2x)\, dx$$

$$\int_0^{\frac{\pi}{2}} x^2 \cos(3x)\, dx$$

$$\int x^2 \ln(x)\, dx$$

$$\int x^n \ln(x)\, dx$$

$$\int_0^1 \text{Arctg}(x)\, dx$$

$$\int_0^1 x\, \text{Arctg}^2[x]\, dx$$

$$\int x \csc^2(x)\, dx$$

$$\int \frac{\ln(2x+1)}{x^2}\, dx$$

$$\int_1^2 \frac{x \ln(x)}{(x^2+1)^2}\, dx$$

$$\int_0^{\frac{\pi}{2}} \cos(x) \ln(\cos(x)+1)\, dx$$

$$\int e^x \cos(x)\, dx$$

$$\int x\, \text{Arctg}(x)\, dx$$

$$\int \ln\left(x+\sqrt{x^2+1}\right) dx$$

$$\int \sin(\ln(x))\, dx$$

$$\int_{-1}^1 \left(x^2+5x+5\right) \cos(2x)\, dx$$

$$\int x^3\, \text{Arcsin}\left(\frac{1}{x}\right) dx$$

Solutions

$$\int_0^1 e^{-x}\, x\, dx = \frac{-2+e}{e}$$

$$\int x \sin(2x)\, dx = \frac{1}{4}\sin(2x) - \frac{1}{2} x\cos(2x) + k$$

$$\int_0^{\frac{\pi}{2}} x^2 \cos(3x)\, dx = \frac{1}{108}\left(8 - 9\pi^2\right)$$

$$\int x^2 \ln(x)\, dx = \frac{1}{3} x^3 \ln(x) - \frac{x^3}{9} + k$$

$$\int x^n \ln(x)\, dx = \frac{x^{n+1}\,((n+1)\ln(x) - 1)}{(n+1)^2} + k$$

$$\int_0^1 \text{Arctg}(x)\, dx = \frac{1}{4}(\pi - \ln(4))$$

$$\int_0^1 x\, \text{Arctg}^2[x]\, dx = \frac{1}{16}((-4+\pi)\pi + \ln(256))$$

$$\int x \csc^2(x)\, dx = \ln(|\sin(x)|) - x\,\text{cotg}(x) + k$$

$$\int \frac{\ln(2x+1)}{x^2}\, dx = 2\ln\left(\frac{x}{2x+1}\right) - \frac{\ln(2x+1)}{x} + k$$

$$\int_1^2 \frac{x\ln(x)}{(x^2+1)^2}\, dx = \ln\left(\frac{2^{13/20}}{\sqrt[4]{5}}\right)$$

$$\int_0^{\frac{\pi}{2}} \cos(x)\ln(\cos(x)+1)\, dx = \frac{1}{2}(-2+\pi)$$

$$\int e^x \cos(x)\, dx = \frac{1}{2} e^x (\cos(x) + \sin(x)) + k$$

$$\int x\,\text{Arctg}(x)\, dx = \frac{1}{2}\text{Arctg}(x)\, x^2 - \frac{x}{2} + \frac{\text{Arctg}(x)}{2} + k$$

$$\int \ln\left(x + \sqrt{x^2+1}\right) dx = x\ln\left(x + \sqrt{x^2+1}\right) - \sqrt{x^2+1} + k$$

$$\int \sin(\ln(x))\, dx = \frac{1}{2} x\sin(\ln(x)) - \frac{1}{2} x\cos(\ln(x)) + k$$

$$\int_{-1}^1 \left(x^2 + 5x + 5\right)\cos(2x)\, dx = \cos(2) + \frac{11\sin(2)}{2}$$

$$\int x^3\, \text{Arcsin}\left(\frac{1}{x}\right) dx = \frac{1}{4}\text{Arcsin}\left(\frac{1}{x}\right) x^4 + \frac{1}{12}\sqrt{1 - \frac{1}{x^2}}\,\left(x^2+2\right) x + k$$