

Integrationsregeln

Prof. Dr. Dörte Haftendorn: Mathematik mit MuPAD 3.1.1, Juni 06 Update 21.06.06

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- `hold(int(k*f(x), x))=int(k*f(x), x);`
`hold(int(f(x)+g(x), x))=int(f(x)+g(x), x);`

$$\int k \cdot f(x) \, dx = \int k \cdot f(x) \, dx$$

$$\int (f(x) + g(x)) \, dx = \int (f(x) + g(x)) \, dx$$

$$\int 1 \, dx = x$$

$$\int x \, dx = \frac{x^2}{2}$$

$$\int x^2 \, dx = \frac{x^3}{3}$$

$$\int x^3 \, dx = \frac{x^4}{4}$$

$$\int x^4 \, dx = \frac{x^5}{5}$$

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

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

$$\int \tan(x) \, dx = -\ln(\cos(x))$$

$$\int e^x \, dx = e^x$$

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

$$\int \frac{1}{x} \, dx = \ln(x)$$

$$\int \frac{1}{x^k} \, dx = -\frac{x}{x^k \cdot (k-1)}$$

Integrationsregeln Bestimmte Integrale -2-

$$\int_a^b f(x) dx = [F(x)]_a^b = F(b) - F(a) \text{ mit } F'(x) = f(x)$$

$$\int_a^b 1 dx = b - a$$

$$\int_a^b x dx = \frac{b^2}{2} - \frac{a^2}{2}$$

$$\int_a^b x^2 dx = \frac{b^3}{3} - \frac{a^3}{3}$$

$$\int_a^b \sin(x) dx = \cos(a) - \cos(b)$$

$$\begin{aligned} \int_0^{\pi} (\sin x + x) dx &= \left[-\cos x + \frac{1}{2} x^2 \right]_0^{\pi} \\ &= -\cos \pi + \frac{1}{2} \pi^2 - (-\cos 0 + 0) \\ &= +1 + \frac{1}{2} \pi^2 + 1 \\ &= 2 + \frac{1}{2} \pi^2 \end{aligned}$$

Teppich-Abroll-Funktion = Integralfunktion der oberen Grenze

- `hold(int(t^2, t=0..x))=int(t^2, t=0..x);`

$$\int_0^x t^2 dt = \frac{x^3}{3}$$

$$\int_a^x f(t) dt = [F(t)]_a^x = F(x) \text{ mit } F'(t) = f(t) \text{ und } F(a) = 0$$

- `parg:=plot::Function2d(x^2, x=-1..5, LineColor=[1,0,0], LineWidth=0.8);`
- `pari:=plot::Integral(plot::Function2d(x^2, x=0..4));`
- `plot(pari, parg)`

