Funktionen – Integralrechnen mit der Summen- und Differenzenregel

Lösungsblatt 1

Berechnen Sie die unbestimmten Integrale mit Hilfe der Summen– und Differenzenregel!

$\int (6x^2 + 5x^4) \,.\, dx = \int (6x^2 \,.\, dx + 5x^4 \,.\, dx) = \frac{6}{2+1} \,.\, x^{2+1} + \frac{5}{4+1} \,.\, x^{4+1} + c =$

$= \frac{6}{3} \,.\, x^3 + \frac{5}{5} \,.\, x^5 + c = \mathbf{2x^3 + x^5 + c}$

$\int (5x^4 - 6x^2) \,.\, dx = \int (5x^4 \,.\, dx - 6x^2 \,.\, dx) = \frac{5}{4+1} \,.\, x^{4+1} - \frac{6}{2+1} \,.\, x^{2+1} + c =$

$= \frac{5}{5} \,.\, x^5 - \frac{6}{3} \,.\, x^3 + c = \mathbf{x^5 - 2x^3 + c}$

$\int \left(\frac{2x^2 - 4x + 3}{x^4} \right) \,.\, dx = \int (2x^{-2} - 4x^{-3} + 3x^{-4}) \,.\, dx = \frac{2x^{-1}}{-1} - \frac{4x^{-2}}{-2} + \frac{3x^{-3}}{-3} + c =$

$= \mathbf{-\frac{2}{x} + \frac{2}{x^2} - \frac{1}{x^3} + c}$

$\int (3x - 5)^2 \,.\, dx = \int (9x^2 - 30\,x + 25) \,.\, dx = \frac{9x^3}{3} - \frac{30x^2}{2} + \frac{25x}{1} + c =$

$= \mathbf{3x^3 - 15x^2 + 25x + c}$

$\int \left(\frac{6x^3 - 4x^2 + 3x}{x^2} \right) \,.\, dx = \int (6x - 4 + \frac{3}{x}) \,.\, dx = \frac{6x^2}{2} - \frac{4x}{1} + 3 \,.\, \ln|x| + c =$

$= \mathbf{3x^2 - 4x + 3 \,.\, \ln|x| + c}$

$\int \left(\frac{4x^2 - 25}{2x - 5} \right) \,.\, dx = \int \left[\frac{(2x+5) \,.\, (2x-5)}{(2x-5)} \right] \,.\, dx = \int (2x + 5) \,.\, dx = \frac{2x^2}{2} + \frac{5x}{1} + c =$

$= \mathbf{x^2 + 5x + c}$

$\int \left(\frac{4x^3 - 2x^2 - 6x}{x^2 + x} \right) \,.\, dx = \int \left[\frac{x \,.\, (4x^2 - 2x - 6)}{x \,.\, (x+1)} \right] \,.\, dx = \int \left[\frac{(4x^2 - 2x - 6)}{(x+1)} \right] \,.\, dx =$

→ *Hier kann zuerst der Bruch vereinfacht werden!*

$(4x^2 - 2x - 6) : (x + 1) = 4x - 6$

$\pm 4x^2 \pm 2x$

$-6x - 6$

$\mp 6x \mp 6$

$0 \quad 0$

$\rightarrow\rightarrow\rightarrow \quad \int (4x - 6) \,.\, dx = \frac{4x^2}{2} - \frac{6x}{1} + c = \mathbf{2x^2 - 6x + c}$

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