

Funktionen – Integralrechnen mit der Summen- und Differenzenregel

Lösungsblatt 1

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

$$\begin{aligned}\int (6x^2 + 5x^4) \cdot dx &= \int (6x^2 \cdot dx + 5x^4 \cdot dx) = \frac{6}{2+1} \cdot x^{2+1} + \frac{5}{4+1} \cdot x^{4+1} + c = \\ &= \frac{6}{3} \cdot x^3 + \frac{5}{5} \cdot x^5 + c = \mathbf{2x^3 + x^5 + c}\end{aligned}$$

$$\begin{aligned}\int (5x^4 - 6x^2) \cdot dx &= \int (5x^4 \cdot dx - 6x^2 \cdot dx) = \frac{5}{4+1} \cdot x^{4+1} - \frac{6}{2+1} \cdot x^{2+1} + c = \\ &= \frac{5}{5} \cdot x^5 - \frac{6}{3} \cdot x^3 + c = \mathbf{x^5 - 2x^3 + c}\end{aligned}$$

$$\begin{aligned}\int \left(\frac{2x^2 - 4x + 3}{x^4} \right) \cdot dx &= \int (2x^{-2} - 4x^{-3} + 3x^{-4}) \cdot dx = \frac{2x^{-1}}{-1} - \frac{4x^{-2}}{-2} + \frac{3x^{-3}}{-3} + c = \\ &= -\frac{2}{x} + \frac{2}{x^2} - \frac{1}{x^3} + c\end{aligned}$$

$$\begin{aligned}\int (3x - 5)^2 \cdot dx &= \int (9x^2 - 30x + 25) \cdot dx = \frac{9x^3}{3} - \frac{30x^2}{2} + \frac{25x}{1} + c = \\ &= \mathbf{3x^3 - 15x^2 + 25x + c}\end{aligned}$$

$$\begin{aligned}\int \left(\frac{6x^3 - 4x^2 + 3x}{x^2} \right) \cdot dx &= \int \left(6x - 4 + \frac{3}{x} \right) \cdot dx = \frac{6x^2}{2} - \frac{4x}{1} + 3 \cdot \ln|x| + c = \\ &= \mathbf{3x^2 - 4x + 3 \cdot \ln|x| + c}\end{aligned}$$

$$\begin{aligned}\int \left(\frac{4x^2 - 25}{2x - 5} \right) \cdot dx &= \int \left[\frac{(2x+5) \cdot (2x-5)}{(2x-5)} \right] \cdot dx = \int (2x + 5) \cdot dx = \frac{2x^2}{2} + \frac{5x}{1} + c = \\ &= \mathbf{x^2 + 5x + c}\end{aligned}$$

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

→ Hier kann zuerst der Bruch vereinfacht werden!

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

$$\begin{array}{r} \pm 4x^2 \pm 2x \\ \hline \end{array}$$

$$- 6x - 6$$

$$\pm 6x \pm 6$$

$$\begin{array}{r} 0 \quad 0 \end{array}$$

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