

Integral Aufgabe 87

Berechnen Sie den Flächeninhalt A zwischen dem Graphen von $f(x)$ und der x-Achse.

$$f(x) = -0,25x^3 - 2x^2 + 0,25x + 2$$

Nullstellen:

$$-0,25x^3 - 2x^2 + 0,25x + 2 = 0 \quad | :(-0,25)$$

$$x^3 + 8x^2 - x - 8 = 0$$

Durch Probieren ermittelt $x_1 = 1$

Polynomdivision:

$$\begin{array}{r}
 x^3 + 8x^2 - x - 8 : x - 1 = x^2 + 9x + 8 \\
 -(x^3 - x^2) \\
 \hline
 9x^2 - x \\
 -(9x^2 - 9x) \\
 \hline
 8x - 8 \\
 -(-8x - 8) \\
 \hline
 0
 \end{array}$$

$$x^2 + 9x + 8 = 0$$

Linearfaktoren:

$$x^2 + 9x + 8 = (x + 8)(x + 1)$$

$$x_2 = -8$$

$$x_3 = -1$$

$$A = \int_{-8}^{-1} (-0,25x^3 - 2x^2 + 0,25x + 2) dx + \int_{-1}^1 (-0,25x^3 - 2x^2 + 0,25x + 2) dx$$

$$A = \left| -\frac{x^4}{16} - \frac{2x^3}{3} + \frac{x^2}{8} + 2x \right|_{-8}^{-1} + \left| -\frac{x^4}{16} - \frac{2x^3}{3} + \frac{x^2}{8} + 2x \right|_{-1}^1$$

$$A = \left| -\frac{1}{16} - \frac{2}{3} + \frac{1}{8} - 2 \right| - \left(-\frac{256}{16} + \frac{341,33}{3} + 8 - 16 \right) +$$

$$+ \left| -\frac{1}{16} - \frac{2}{3} + \frac{1}{8} + 2 - \left(-\frac{1}{16} + \frac{2}{3} + \frac{1}{8} - 2 \right) \right|$$

$$A = |-78,6| + |2,67|$$

$$\mathbf{A = 81,27}$$

