Integral Aufgabe 143

Berechnen Sie den Flächeninhalt A zwischen $f_{(x)} = (1/3)x^2$ und $g_{(x)} = x - (1/12)x^3$.

Schnittpunkte:

$f_{(x)} = g_{(x)}$

$$\frac{1}{3}x^2 = x - \frac{1}{12}x^3 \quad | \cdot 12$$

$4x^2 = 12x - x^3 \quad |+x^3 - 12x$

$x^3 + 4x^2 - 12x = 0$

$x(x^2 + 4x - 12) = 0$

$x_1 = 0$

$x^2 + 4x - 12 = 0$

Linearfaktoren:

$x^2 + 4x - 12 = (x + 6)(x - 2)$

$x_2 = -6$

$x_3 = 2$

$$f_{(x)} - g_{(x)} = \frac{1}{3}x^2 - \left(x - \frac{1}{12}x^3\right) = \frac{1}{3}x^2 - x + \frac{1}{12}x^3$$

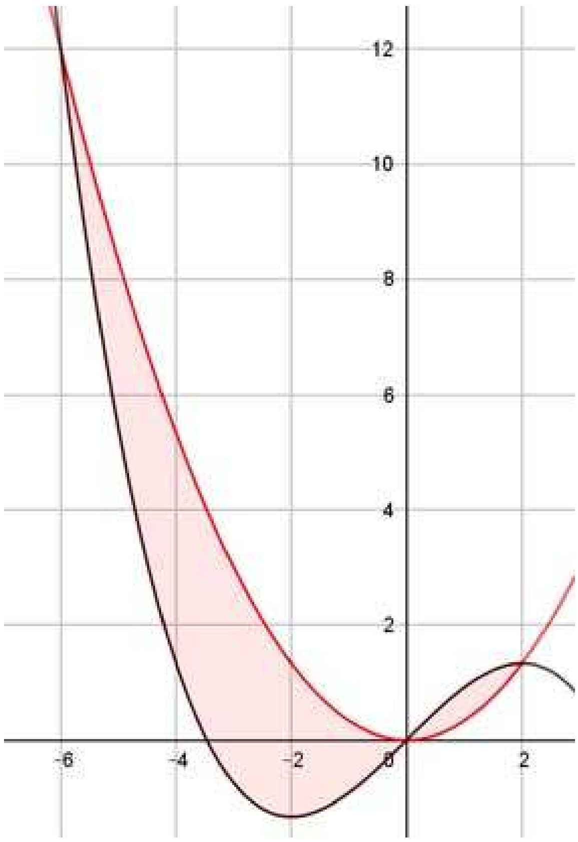
$$A = \int_{-6}^{0}\left(\frac{1}{3}x^2 - x + \frac{1}{12}x^3\right)dx + \int_{0}^{2}\left(\frac{1}{3}x^2 - x + \frac{1}{12}x^3\right)dx$$

$$A = \left|\frac{x^3}{9} - \frac{x^2}{2} + \frac{x^4}{48}\right|_{-6}^{0} + \left|\frac{x^3}{9} - \frac{x^2}{2} + \frac{x^4}{48}\right|_{0}^{2}$$

$A = |0 - (-24 - 18 + 27| + |0{,}89 - 2 + 0{,}33 - 0|$

$A = |15| + |-0{,}78|$

$A = 15{,}78$


12
10
8
6
4
2
-6
-4
-2
0
2