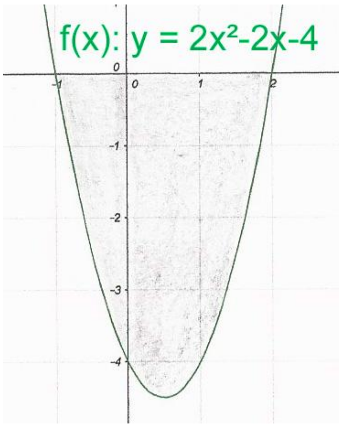
Funktionen – Anwendung der Integralrechnen – Flächeninhalt von f(x)

Lösungsblatt 2

f(x): $y = (2x^2 - 2x - 4)$; Intervall → = Nullstellen der Funktion f(x); → = (-1;+2)

$\rightarrow \quad 2x^2 - 2x - 4 = 0 \quad \rightarrow \quad x^2 - x - 2 = 0$

$\rightarrow \quad x_{1,2} = \frac{1}{2} \pm \sqrt{\left(\frac{1}{2}\right)^2 + \frac{8}{4}} \qquad x_{1,2} = \frac{1}{2} \pm \frac{3}{2}$; Intervall:(-1; +2)



$$\int_a^b f(x)\,.\,dx = \int_{-1}^{+2} (2x^2 - 2x - 4)\,.\,dx =$$

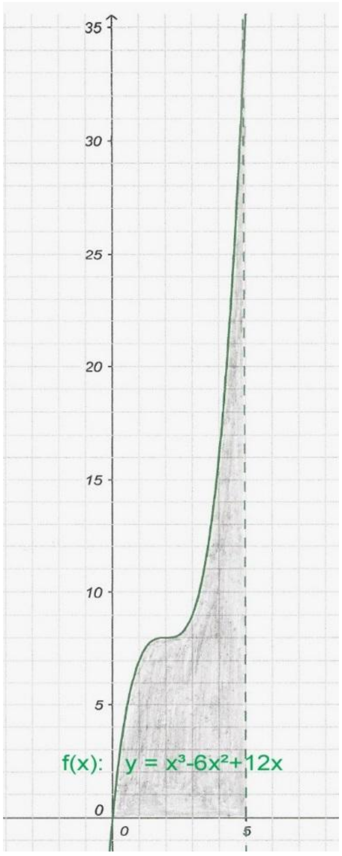
$$= \left(\frac{2}{3}\,.\,x^3 - \frac{2}{2}\,.\,x^2 - \frac{4}{1}\,.\,x\right)\Big|_{-1}^{+2}$$

$$A(-1;+2) = \left(\frac{2}{3}x^3 - x^2 - 4x\right)\Big|_{0}^{-1} + \left(\frac{2}{3}x^3 - x^2 - 4x\right)\Big|_{0}^{+2} =$$

$$= \left(-\frac{2}{3} - 1 + 4\right) \quad + \quad \left(\frac{16}{3} - 4 - 8\right) =$$

$$= \frac{7}{3} - \frac{20}{3} \quad = \quad \left|\frac{7}{3}\right| + \left|\frac{20}{3}\right| \quad = \quad \frac{27}{3} \quad = \quad \mathbf{9\ FE}$$

f(x): $y = (x^3 - 6x^2 + 12x)$; Intervall: (a = 0/b = +5);



$$\int_a^b f(x)\,.\,dx = \int_0^{+5} (x^3 - 6x^2 + 12x)\,.\,dx =$$

$$= \left(\frac{1}{4}x^4 - \frac{6}{3}x^3 + \frac{12}{2}x^2\right)\Big|_{0}^{+5};$$

$$A(0;+5) = \left(\frac{1}{4}x^4 - 2x^3 + 6x^2\right)\Big|_{0}^{+5} =$$

$$= \left(\frac{625}{4} - 250 + 150\right) + 0 = \frac{225}{4} = \mathbf{56{,}25\ FE}$$