Hausaufgabe

Mathebuch . S. 213 Nr 1,2,3

Aufgabe 1:

a) $f(x) = \frac{3}{4}x^2 + 1$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

Aufleitung:

$f(x) = \frac{3}{4}x^2 + 1$

$F(x) = \frac{\frac{3}{4}}{2+1}x^{2+1} + 1$

$\qquad = \frac{1}{4}x^3 + x$

$$A = \int_1^3 \left(\frac{3}{4}x^2 + 1\right)dx = \left[\frac{1}{4}x^3 + x + c\right]_1^3 = 9{,}75 - 1{,}25 = \underline{8{,}5}$$

$F(b) = \frac{1}{4}\cdot 3^3 + 1\cdot 3 + c = 9{,}75$

$F(a) = \frac{1}{4}\cdot 1^3 + 1\cdot 1 + c = 1{,}25$

b) $g(x) = -x^2 - 2x + 4$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

Aufleitung:

$g(x) = -x^2 - 2x + 4$

$G(x) = \frac{-1}{2+1}x^{2+1} - \frac{2}{1+1}x^{1+1} + 4$

$\qquad = -\frac{1}{3}x^3 - x^2 + 4x$

$$A = \int_{-2}^1 \left(-x^2 - 2x + 4\right)dx = \left[-\frac{1}{3}x^3 - x^2 + 4x + c\right]_{-2}^1 =$$

$2{,}7 - (-9{,}3) = \underline{\underline{12}}$

$F(b) = -\frac{1}{3}\cdot 1^3 - 1\cdot 1^2 + 4\cdot 1 + c = 2{,}7$

$F(a) = -\frac{1}{3}\cdot(-2)^3 - 1\cdot(-2)^2 + 4\cdot(-2) + c = -9{,}3$

c) $h(x) - x^4 + 3x^2 + 4$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

Aufleitung:

$h(x) = -x^4 + 3x^2 + 4$

$H(x) = \frac{-1}{4+1}x^{4+1} + \frac{3}{2+1}x^{2+1} + 4$

$$= -\frac{1}{5}x^5 + x^3 + 4x$$

$A = \int_{-2}^{2} (-x^4 + 3x^2 + 4)\,dx = \left[-\frac{1}{5}x^5 + x^3 + 4x + C\right]_{-2}^{2} =$

$9{,}6 - (-9{,}6) = \underline{19{,}20}$

$F(b) = -\frac{1}{5}\cdot 2^5 + 1\cdot 2^3 + 4\cdot 2 + C = 9{,}6$

$F(a) = -\frac{1}{5}\cdot(-2)^5 + 1\cdot(-2)^3 + 4\cdot(-2) + C = -9{,}6$

Aufgabe 2:

$f(x) = -x^2 + 8x$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

Aufleitung:

$f(x) = -x^2 + 8x$

$F(x) = \frac{-1}{2+1}x^{2+1} + \frac{8}{1+1}x^{1+1}$

$$= -\frac{1}{3}x^3 + 4x^2$$

$A = \int_{2}^{8} (-x^2 + 8x)\,dx = \left[-\frac{1}{3}x^3 + 4x^2 + C\right]_{2}^{8} = 85{,}3 - 13{,}3 = \underline{72}$
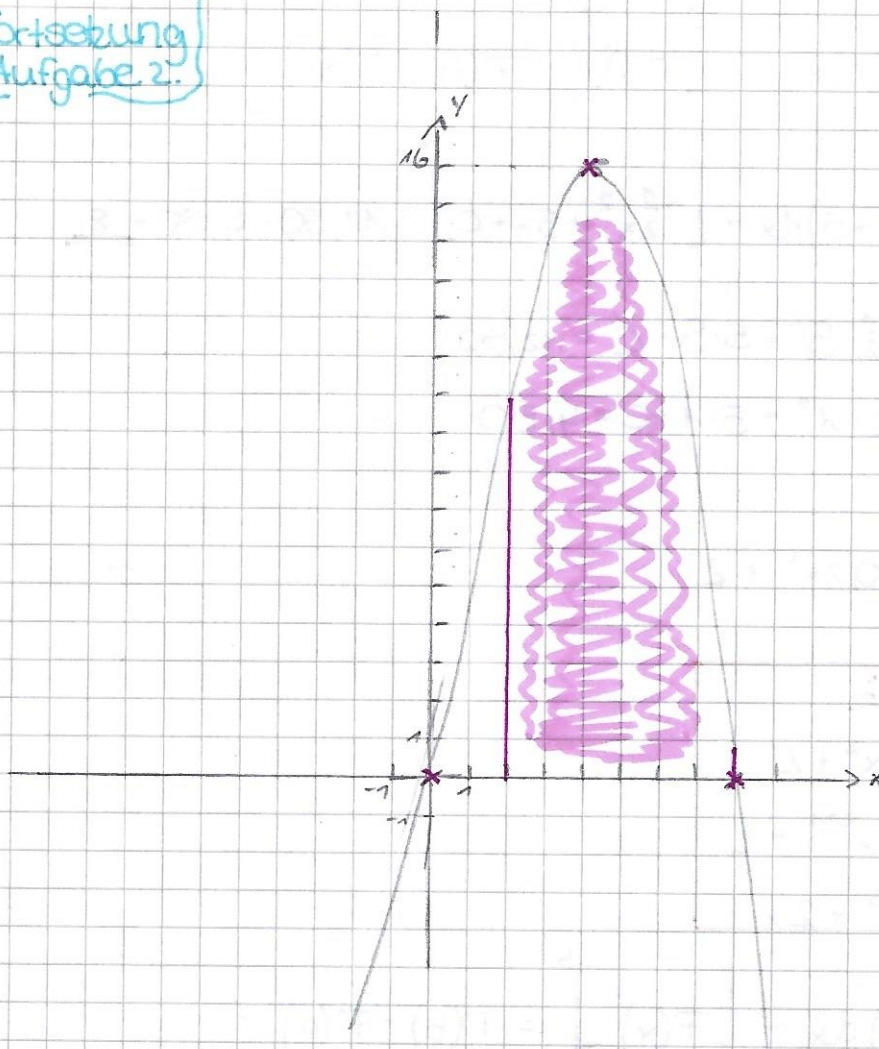
$F(b) = -\frac{1}{3}\cdot 8^3 + 4\cdot 8^2 + C = 85{,}3$

$F(a) = -\frac{1}{3}\cdot 2^3 + 4\cdot 2^2 + C = 13{,}3$

weiter

Aufgabe 3:

a) $f(x) = -x + 5$

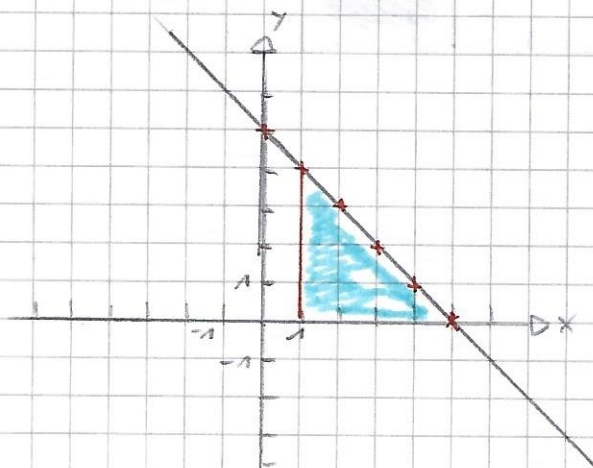### Wertetabelle:

x	0	1	2	3
y	5	4	3	2

Aufleitung:

$f(x) = -x + 5$

$F(x) = \frac{-1}{1+1} x^{1+1} + 5$

$= -\frac{1}{2} x^2 + 5x$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

$$A = \int_1^5 (-x+5)\,dx = \left[-\tfrac{1}{2}x^2 + 5x + C\right]_1^5 = 12{,}50 - 4{,}50 = \underline{8}$$

$$F(b) = -\tfrac{1}{2}\cdot 5^2 + 5\cdot 5 + C = 12{,}50$$

$$F(a) = -\tfrac{1}{2}\cdot 1^2 + 5\cdot 1 + C = 4{,}50$$

b) $f(x) = 0{,}2x^2 + 2$

Aufleiten:

$$f(x) = 0{,}2x^2 + 2$$
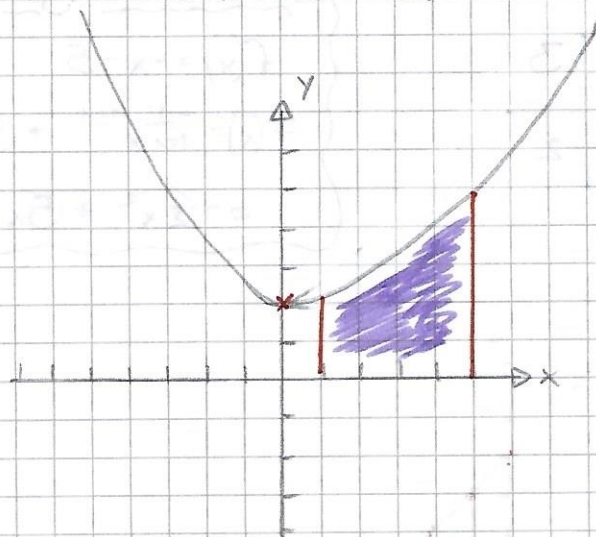
$$F(x) = \tfrac{0{,}2}{2+1}x^{2+1} + 2$$

$$= \tfrac{1}{15}x^3 + 2x$$

$$\int_a^b f(x)\,dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

$$A = \int_1^5 (0{,}2x^2 + 2)\,dx = \left[\tfrac{1}{15}x^3 + 2x + C\right]_1^5 = 18{,}33 - 2{,}07 = 16{,}26$$

$$F(b) = \tfrac{1}{15}\cdot 5^3 + 2\cdot 5 + C = 18{,}33$$

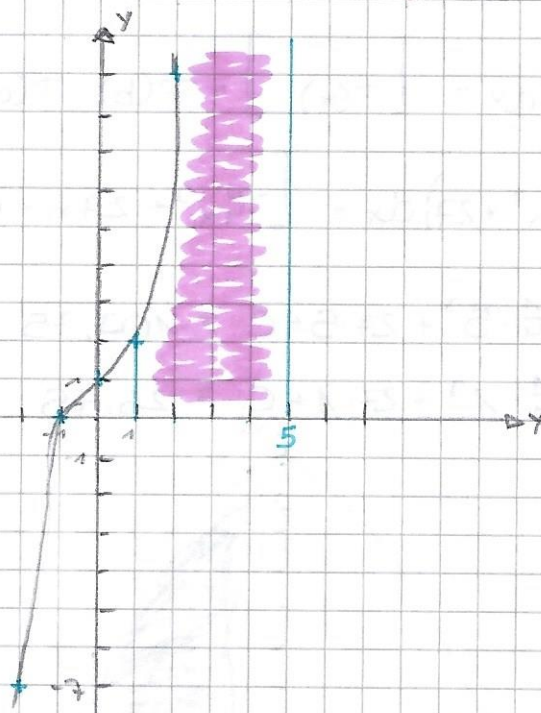$$F(a) = \tfrac{1}{15}\cdot 1^3 + 2\cdot 1 + C = 2{,}07$$

c) $f(x) = x^3 + 1$

Wertetabelle:

x	-2	-1	0	1	2
Y	-7	0	1	2	9

$$A = {_a}\int^b f(x)\, dx = \left[\overline{F}(x)\right] = \overline{F}(b) - \overline{F}(a)$$

Aufleiten

$f(x) = x^3 + 1$

$\overline{F}(x) = \frac{1}{3+1} x^{3+1} + 1$

$= \frac{1}{4} x^4 + x$

$A \quad {_1}\int^5 (x^3 + 1)\, dx = \left[\frac{1}{4} x^4 + x\right] = 161,25 - 1,25 = \underline{160}$

$\overline{F}(b) = \frac{1}{4} \cdot 5^4 + 1 \cdot 5 + C = 161,25$

$\overline{F}(a) = \frac{1}{4} \cdot 1^4 + 1 \cdot 1 + C = 1,25$

d) $f(x) = -\frac{3}{4}x^2 + 27$

Aufleiten:

$f(x) = -\frac{3}{4}x^2 + 27$

$F(x) = \frac{-\frac{3}{4}}{2+1}x^{2+1} + 27$

$\qquad = -\frac{1}{4}x^3 + 27x$

$\int_a^b f(x)\,dx = \left[F(x) \right] = F(b) - F(a)$

$A_1 \int_1^5 \left(-\frac{3}{4}x^2 + 27\right)dx = \left[-\frac{1}{4}x^3 + 27x + c\right] = 103,75 - 26,75 = \underline{77}$

$F(b) = -\frac{1}{4} \cdot 5^3 + 27 \cdot 5 + c = 103,75$

$F(a) = -\frac{1}{4} \cdot 1^3 + 27 \cdot 1 + c = 26,75$