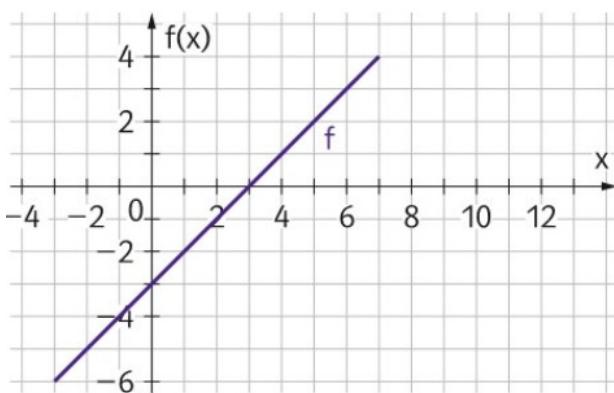


Aufgabe 71

Gegeben ist der Graph einer Funktion f . Berechne den Wert $\int_a^b f(x) dx$.

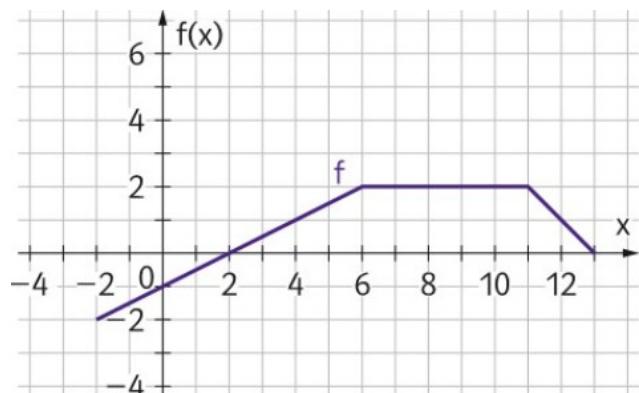
a)

- 1) $a = -3 \quad b = 7$
- 2) $a = -1 \quad b = 3$



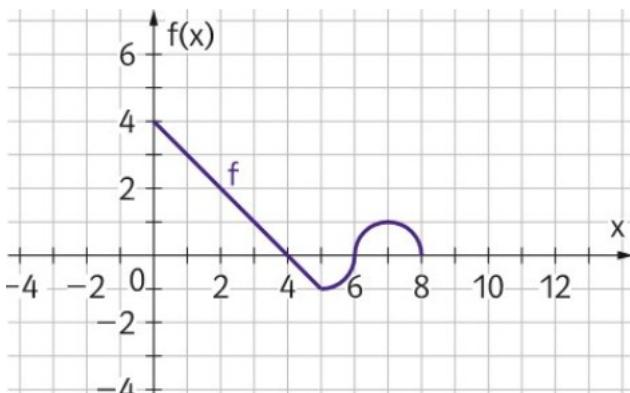
b)

- 1) $a = -2 \quad b = 13$
- 2) $a = 2 \quad b = 12$



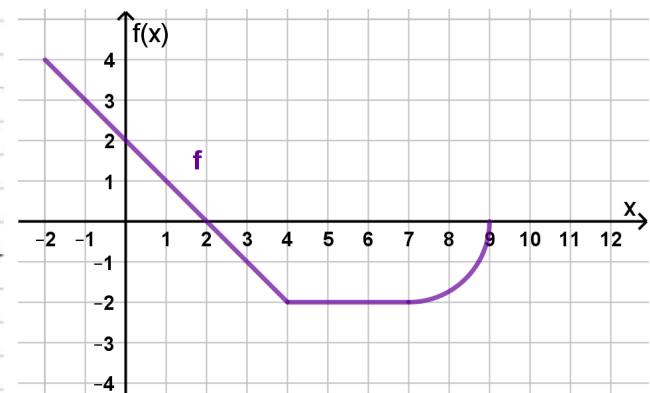
c)

- 1) $a = 0 \quad b = 8$
- 2) $a = 4 \quad b = 7$



d)

- 1) $a = -2 \quad b = 9$
- 2) $a = 0 \quad b = 9$



Lösungen:

Ad a)

Ad 1)

$$\begin{aligned}
 \int_{-2}^{13} f(x) dx &= \int_{-2}^2 f(x) dx + \int_2^{13} f(x) dx = \int_{-1}^3 f(x) dx = \frac{-4 \cdot 4}{2} = \\
 &= \frac{-2 \cdot 4}{2} + \frac{(11+5) \cdot 2}{2} = &= -8 \\
 &= -4 + 16 = &= \\
 &= \mathbf{12}
 \end{aligned}$$

Ad 2)

Ad b)

Ad 1)

$$\begin{aligned}
 \int_{-3}^7 f(x) dx &= \int_{-3}^3 f(x) dx + \int_3^7 f(x) dx = \int_2^{12} f(x) dx = \frac{(11+5) \cdot 2}{2} = \\
 &= \frac{-6 \cdot 6}{2} + \frac{4 \cdot 4}{2} = &= 16 \\
 &= -18 + 8 = &= \\
 &= \mathbf{-10}
 \end{aligned}$$

Ad 2)

Ad c)

Ad 1)

$$\begin{aligned}
 \int_0^8 f(x) dx &= \int_0^4 f(x) dx + \\
 &+ \int_4^5 f(x) dx + \\
 &+ \int_5^6 f(x) dx + \\
 &+ \int_6^8 f(x) dx = \\
 &= \frac{4 \cdot 4}{2} + \frac{(-1 \cdot 1)}{2} + \\
 &+ \frac{\pi}{4} + \frac{\pi}{2} = \\
 &= \mathbf{8,29}
 \end{aligned}$$

Ad 2)

$$\begin{aligned}
 \int_4^7 f(x) dx &= \int_4^5 f(x) dx + \\
 &+ \int_5^6 f(x) dx + \\
 &+ \int_6^7 f(x) dx = \\
 &= \frac{(-1 \cdot 1)}{2} - \frac{\pi}{4} + \frac{\pi}{4} = \\
 &= \mathbf{-0,5}
 \end{aligned}$$

Ad d)

Ad 1)

$$\begin{aligned}
 \int_{-2}^9 f(x) dx &= \int_{-2}^2 f(x) dx + \\
 &+ \int_2^4 f(x) dx + \\
 &+ \int_4^7 f(x) dx + \\
 &+ \int_7^9 f(x) dx = \\
 &= \frac{4 \cdot 4}{2} + \frac{(-2 \cdot 2)}{2} + \\
 &+ -2 \cdot 3 - \frac{4\pi}{4} = \\
 &= -\pi
 \end{aligned}$$

Ad 2)

$$\begin{aligned}
 \int_0^9 f(x) dx &= \int_0^2 f(x) dx + \\
 &+ \int_2^4 f(x) dx + \\
 &+ \int_4^7 f(x) dx + \\
 &+ \int_7^9 f(x) dx = \\
 &= \frac{2 \cdot 2}{2} + \frac{(-2 \cdot 2)}{2} + \\
 &+ -2 \cdot 3 - \frac{4\pi}{4} = \\
 &= -9,14
 \end{aligned}$$