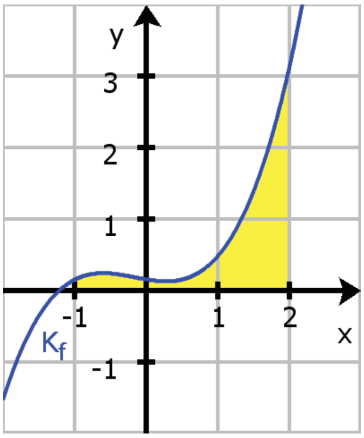
Lösung

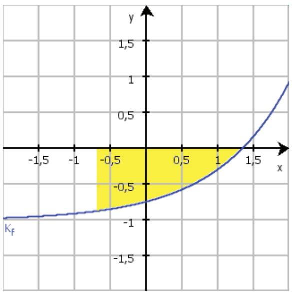


$$A=\int_{-1}^{2}\left(\frac{1}{3}x^3+\frac{1}{6}x^2-\frac{1}{6}x+\frac{1}{6}\right)dx$$

$$=\left[\frac{1}{12}x^4+\frac{1}{18}x^3-\frac{1}{12}x^2+\frac{1}{6}x\right]_{-1}^{2}$$

$$=2\text{ FE}$$

Lösung



Nullstelle der Funktion berechnen:

Setze $f(x)=0$:

$$\begin{aligned} e^{x-\frac{4}{3}}-1 &= 0 && \mid +1 \\ e^{x-\frac{4}{3}} &= 1 && \mid \ln \\ x-\frac{4}{3} &= \ln(1) && \mid +\frac{4}{3} \\ x &= \frac{4}{3} \end{aligned}$$

$$N\left(\frac{4}{3}\,\middle|\,0\right)$$

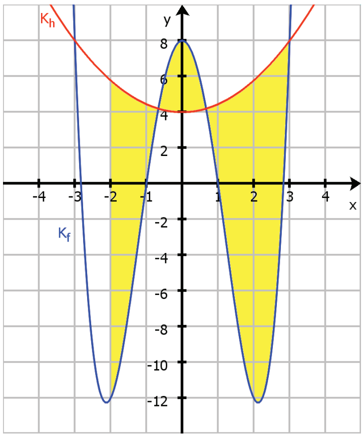
$$A=-\int_{-\frac{2}{3}}^{\frac{4}{3}}\left(e^{x-\frac{4}{3}}-1\right)dx$$

$$=-\left[e^{x-\frac{4}{3}}-x\right]_{-\frac{2}{3}}^{\frac{4}{3}}$$

$$=-\left(e^0-\frac{4}{3}-\left(e^{-2}+\frac{2}{3}\right)\right)$$

$$=1+e^{-2}\text{ FE}$$

Lösung



Berechne die Schnittpunkte von K_f und K_h

$$x^4 - 9x^2 + 8 = \frac{4}{9}x^2 + 4 \quad \left| -\frac{4}{9}x^2 - 4 \right.$$

$$x^4 - \frac{85}{9}x^2 + 4 = 0 \quad | \text{ Substitution: } x^2 \to u$$

$$u^2 - \frac{85}{9}u + 4 = 0$$

Setze $a=1,\ b=-\frac{85}{9},\ c=4$ in die Lösungsformel ein:

$$u_{1,2} = \frac{\frac{85}{9} \pm \sqrt{\left(-\frac{85}{9}\right)^2 - 4 \cdot 1 \cdot 4}}{2 \cdot 1}$$

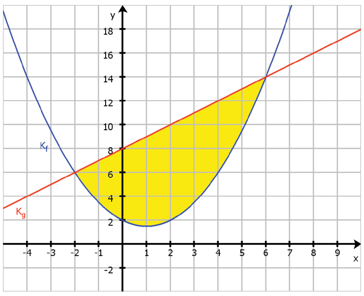
$$u_1 = 9 \qquad u_2 = \frac{4}{9}$$

Rücksubstitution: $u \to x^2$

$$u_1 \to x_{1,2} = \pm 3 \qquad u_2 \to x_{3,4} = \pm\frac{2}{3}$$

$$\begin{aligned} A &= \int_{-2}^{-\frac{2}{3}} \left(-x^4 + \frac{85}{9}x^2 - 4\right) dx \\ &\quad + \int_{-\frac{2}{3}}^{\frac{2}{3}} \left(x^4 - \frac{85}{9}x^2 + 4\right) dx \\ &\quad + \int_{\frac{2}{3}}^{3} \left(-x^4 + \frac{85}{9}x^2 - 4\right) dx \\ &= 12{,}5454 \\ &\quad + 3{,}5204 \\ &\quad + 26{,}1602 \\ &= 42{,}226 \text{ FE} \end{aligned}$$

Lösung

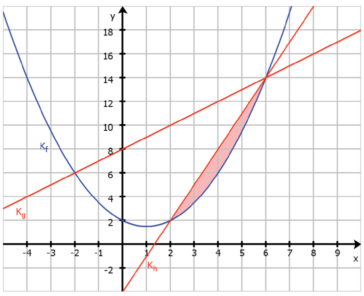


Berechnung der Schnittstellen von K_f und K_g: $x_1 = -2,\quad x_2 = 6$

Berechnung des Flächeninhalts zwischen K_f und K_g:

$$A_1 = \int_{-2}^{6} \left(x + 8 - \left(\frac{1}{2}x^2 - x + 2\right)\right) dx = \int_{-2}^{6} \left(-\frac{1}{2}x^2 + 2x + 6\right) dx$$

$$= \left[-\frac{1}{6}x^3 + x^2 + 6x\right]_{-2}^{6} = \frac{128}{3}\text{ FE}$$



Berechnung der Schnittstellen von K_f und K_h: $x_1 = 2,\quad x_2 = 6$

Berechnung des Flächeninhalts zwischen K_f und K_h:

$$A_2 = \int_{2}^{6} \left(3x - 4 - \left(\frac{1}{2}x^2 - x + 2\right)\right) dx = \int_{-2}^{6} \left(-\frac{1}{2}x^2 + 4x - 6\right) dx$$

$$= \left[-\frac{1}{6}x^3 + 2x^2 - 6x\right]_{2}^{6} = \frac{16}{3}\text{ FE}$$

Berechnung des gesuchten Flächeninhalts: $A = A_1 - A_2 = \frac{128}{3} - \frac{16}{3} = \frac{112}{3}\text{ FE}$