S 74 Nr. 6 $\quad f_k(t) = 8 - 2\cdot e^{-kt}$ in 10^3

a) $f_k(0) = 8\cdot 10^3 - 2\cdot 10^3\cdot e^{-k\cdot 0} = 6\cdot 10^3$ Ameisen

b) $f_k(3) = 7\cdot 10^3 = 8\cdot 10^3 - 2\, 10^3\cdot e^{-k\cdot 3} \;\Big|:10^3$

$$7 = 8 - 2\cdot e^{-k\cdot 3} \;\Big| +2\cdot e^{-k\cdot 3} - 7$$

$$2\cdot e^{-k\cdot 3} = 1 \;\Big|:2 \;\Big|\ln$$

$$-k\cdot 3 = \ln\left(\frac{1}{2}\right) \;\Big|\cdot\left(-\frac{1}{3}\right)$$

$$k = -\frac{1}{3}\cdot\ln\left(\frac{1}{2}\right) \approx 0{,}231$$

c) $f_k'(t) = -2\cdot 10^3\cdot e^{-k\cdot t}\cdot(-k) = 2k\cdot 10^3\cdot e^{-k\cdot t}$

$$f_k'(0) = 250 = 2k\cdot 10^3\cdot e^{-k\cdot 0} = 2k\cdot 10^3 \;\Big|:(2\cdot 10^3)$$

$$\frac{250}{2\cdot 10^3} = 0{,}125 = k$$

S 74 Nr. 7

a) $f_a(x) = x^2 - ax + 4$, $\quad f_a'(x) = 2x - a$; $\quad f_a''(x) = 2 > 0$

Extrema notw Bed $f_a'(x) = 2x - a = 0 \Rightarrow x_E = +\frac{a}{2}$

$f_a''\left(+\frac{a}{2}\right) = 2 > 0 \Rightarrow T\left(+\frac{a}{2} \,\Big|\, \left(+\frac{a}{2}\right)^2 - a\left(+\frac{a}{2}\right) + 4\right) = \left(+\frac{a}{2} \,\Big|\, -\frac{1}{4}a^2 + 4\right)$

Damit T auf x-Achse liegt muss $-\frac{1}{4}a^2 + 4 = 0$ sein

$\Rightarrow \frac{1}{4}a^2 = +4 \;\Big|\cdot\frac{4}{1} \Rightarrow a^2 = +\frac{16}{1} \Rightarrow a_{1,2} = \pm 4$

b) $f_a(x) = \frac{ax^3+2}{2x^2} = \frac{a}{2}x + \frac{1}{x^2}$; $\quad f_a'(x) = \frac{a}{2} + \frac{-2}{x^3}$; $\quad f_a''(x) = \frac{6}{x^4}$

Extrema notw Bed $f_a'(x) = 0 = \frac{a}{2} - \frac{2}{x^3} = \frac{ax^3 - 4}{2x^3}$

$\Rightarrow ax^3 - 4 = 0 \Rightarrow ax^3 = 4 \Rightarrow x_E = \sqrt[3]{\frac{4}{a}}$ hinr Bed $f_a''\left(\sqrt[3]{\frac{4}{a}}\right) = \frac{6}{\left(\sqrt[3]{\frac{4}{a}}\right)^4} > 0$

$$T\left(\sqrt[3]{\frac{4}{a}} \,\Bigg|\, \frac{a\frac{4}{a}+2}{2\sqrt[3]{\frac{16}{a^2}}}\right) = T\left(\sqrt[3]{\frac{4}{a}} \,\Bigg|\, \frac{6}{2\sqrt[3]{\frac{16}{a^2}}}\right) = T\left(\sqrt[3]{\frac{4}{a}} \,\Bigg|\, \underbrace{\frac{3\cdot\sqrt[3]{a^2}}{\sqrt[3]{16}}}_{\neq 0 \text{ für } a\neq 0}\right)$$