Nr. 5) $f_c(x) = e^{cx+1}$

a) $f_c(2) = 3 = e^{c\cdot 2+1} \quad | \ln$

$\ln(3) = c \cdot 2 + 1 \quad | -1$

$\ln(3) - 1 = c \cdot 2 \quad | :2$

$\underline{\underline{c}} = \frac{\ln(3)}{2} - \frac{1}{2} \approx \underline{\underline{0{,}0493}}$

b) $f_c'(x) = e^{cx+1} \cdot c = c \cdot e^{cx+1}$

$f_c'(0) = 2 = c \cdot e^{c\cdot 0+1} = c \cdot e^1 \quad | :e$

$\underline{\underline{\frac{2}{e} = c \approx 0{,}7358}}$

Nr. 8) $f_k(t) = 8 - 2 \cdot e^{-kt}$

a) $\underline{\underline{f_k(0)}} = 8 - 2e^{-k\cdot 0} = 8 - 2 \cdot e^0 = 8 - 2 \cdot 1 = \underline{\underline{6}}$

Zu Beginn waren es $\underline{\underline{6000}}$ Ameisen.

b) $f_k(3) = 8 - 2 \cdot e^{-k\cdot 3} = 7 \quad | -8$

$-2 \cdot e^{-k\cdot 3} = -1 \quad | :(-2)$

$e^{-k\cdot 3} = \frac{1}{2} \quad | \ln$

$-k \cdot 3 = \ln\left(\frac{1}{2}\right) = \ln(1) - \ln(2) = 0 - \ln(2) \quad | :(-3)$

$\underline{\underline{k}} = \frac{-\ln(2)}{-3} = \frac{1}{3} \cdot \ln(2) \approx \underline{\underline{0{,}2310}}$

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

$f_k'(0) = 2k \cdot \underbrace{e^{-k\cdot 0}}_{=1} = 0{,}250 \quad | :2 \Rightarrow \underline{\underline{k = \frac{0{,}25}{2} = \frac{1}{4\cdot 2} = \frac{1}{8}}}$

d) Für $k > 0$ gilt $\underline{\underline{\lim\limits_{t\to\infty} (8 - \underbrace{2 \cdot e^{-kt}}_{\to 0}) = 8}}$

Man muss langfristig mit 8000 Ameisen rechnen.

O. Fell