

# Lösungen zu PV 3

①

1.) a) Beginn  $\Rightarrow t=0 \Rightarrow$  Konstante ablesen  
 $T=38,4^\circ$

$$b) T'(t) = -0,4t^3 + 1,6t$$

$$T''(t) = -1,2t^2 + 1,6$$

$$T'(t) = 0$$

$$0 = -0,4t^3 + 1,6t \quad t \text{ ausklammern}$$

$$0 = t(-0,4t^2 + 1,6)$$

$$t_1 = 0 \quad -0,4t^2 + 1,6 = 0 \quad | :(-0,4)$$

$$t^2 - 4 = 0$$

$$t^2 = 4$$

$$T''(0) = 1,6 > 0 \Rightarrow \text{Min}$$

$$T''(2) = -3,2 < 0 \Rightarrow \text{Max} \rightarrow$$

$$[t_2 = -2]$$

$$t_3 = 2$$

c)  $37,5 = T$

$$37,5 = -0,1t^4 + 0,8t^2 + 38,4 \quad | -37,5$$

$$0 = -0,1t^4 + 0,8t^2 + 0,9 \quad | :(-0,1)$$

$$0 = t^4 - 8t^2 - 9$$

$$t^2 = z$$

$$0 = z^2 - 8z - 9$$

p-q-Formel

$$z_1 = 9 \quad z_2 = -1$$

$$z = t^2$$

$$t^2 = 9 \quad | \sqrt{\quad} \quad t^2 = -1 \quad /$$

$$t_1 = 3$$

$$[t_2 = -3]$$

2.) a) 80 Kaninchen, da  $t=0$

b)  $f'(t) = -6t^2 + 36t - 30$

$f''(t) = -12t + 36$

$f'(t) = 0 \quad 0 = -6t^2 + 36t - 30 \quad | : (-6)$   
 p-q-Formel

$t_1 = 5 \quad t_2 = 1$

$f''(5) = -24 < 0 \Rightarrow \text{Max} \uparrow$

$f''(1) = +24 > 0 \Rightarrow \text{Min}$

c)  $f(5) = 140$   
 $f(1) = 76$

$140 - 76 = \underline{64}$  Kaninchen  
 Differenz

d)  $f(0) = 80$   
 $f(6) = 126$

$126 - 80 = \underline{36}$  Kaninchen Zunahme

3.) a)  $t=0 \Rightarrow 20 \cdot 1000 = 20.000 \text{ €}$

b)  $f'(t) = \frac{1}{2}t^3 - 3t^2 - 2t + 12$

$f''(t) = \frac{3}{2}t^2 - 6t - 2$

$f'(t) = 0 \quad 0 = \frac{1}{2}t^3 - 3t^2 - 2t + 12 \quad | : (\frac{1}{2})$

$0 = t^3 - 6t^2 - 4t + 24 \quad t_1 = 2$

Poly nomdivision führt zu

$t^2 - 4t - 12 = 0 \quad \text{pq Formel}$

$\Rightarrow t_2 = 6 \quad [t_3 = -2]$

$f''(2) = -8 < 0 \Rightarrow \text{Max}$

$f''(6) = 16 > 0 \Rightarrow \text{Min}$

$f(2) = 34 \Rightarrow$   
 $\begin{array}{r} 34.000 \\ - 20.000 \text{ Einsatz} \\ \hline 14.000 \text{ Gewinn!} \end{array}$

c)  $f(6) = 2 \Rightarrow 2.000 \text{ €}$

$\begin{array}{r} 20.000 \\ - 2.000 \\ \hline 18.000 \text{ € Verlust!} \end{array}$

(3)

$$4.) a) f'(x) = -0,6x^2 + 1,2x + 1,8$$

$$f''(x) = -1,2x + 1,2$$

$$f'(x) = 0 \quad 0 = -0,6x^2 + 1,2x + 1,8 \quad | :(-0,6)$$

$$p-q \Rightarrow x_1 = 3 \quad [x_2 = -1]$$

$$f''(3) = -2,4 < 0 \Rightarrow \text{Max.}$$

$$\underline{f(3) = 3223,4}$$

$$b) \underline{f(10) = 3096}$$

$$c) x = -1? \quad f''(-1) = 2,4 > 0 \Rightarrow \text{Min}$$

aus a)

$$2000 - 1 \text{ Jahr} = \underline{1999}$$