P1 [2]
$$f'(x) = 2x \cdot e^{-2x} + (-2x^2)\, e^{-2x} \quad 1$$
$$= 2x \cdot e^{-2x}(1-x)$$
$$= e^{-2x}(2x - 2x^2) \quad 1$$

P2 [2]
$$F(x) = 6 \cdot \frac{1}{-2} \cdot e^{-2x+4} + 3x + c$$
$$= -3 \cdot e^{-2x+4} + 3x + c \quad 1$$

P3 [2]
$$z = e^x \qquad z^2 + z - 2 = 0$$
$$z_1 = 1 \qquad e^x = 1 \qquad x = 0 \quad 1$$
$$z_2 = -2 \quad 1 \qquad e^x > 0 \qquad \text{entfällt}$$

P4 [1]
$$\left(2^2\right)^{\log_2(3)} = \left(2^{\log_2(3)}\right)^2 = 3^2 = 9 \quad 1$$

P5 [a] 1 $6 \cdot (-6) + 6 \cdot 3 + 7 \cdot 3 = -36 + 18 + 21 = 3$
[5] $P \in E_1$ 1

[b] 2 NR:
$$\begin{matrix} 1 & 6 \\ -1 & 1 \\ 0 & -6 \\ 1 & 6 \\ -1 & 1 \end{matrix} \qquad \begin{matrix} 6 \\ 6 \\ 7 \end{matrix} \qquad \vec{n_2} = \begin{pmatrix} 6 \\ 6 \\ 7 \end{pmatrix} \; 1 \Rightarrow E_1 \parallel E_2 \quad 1$$

[c] 2 $E_2: 6x_1 + 6x_2 + 7x_3 = 124$
HNF $\dfrac{6x_1 + 6x_2 + 7x_3 - 124}{\sqrt{121}} = 0$ 1
P eins.: $\left|\dfrac{-36+18+21-124}{11}\right| = |-11|$ 1
oder HNF von E_1: $\dfrac{6x_1 + 6x_2 + 7x_3 - 3}{11} = 0$
$(0|9|10) \rightarrow \qquad \dfrac{121}{11} = 11 = d$

P6 [a 2]
$$f(0) = 0 \qquad N = S_y = (0|0) \quad 1$$
$$\lim_{x \to -\infty} f(x) = -\infty \qquad \lim_{x \to \infty} f(x) = 0 \quad 1$$
$$f'(x) = 10\, e^{-\frac{1}{2}x} - 5x\, e^{-\frac{1}{2}x} = e^{-\frac{1}{2}x}(10 - 5x)$$
$$f''(x) = -5\, e^{-\frac{1}{2}x} + (2{,}5x - 5)\, e^{-\frac{1}{2}x}$$
$$= (2{,}5x - 10)\, e^{-\frac{1}{2}x}$$

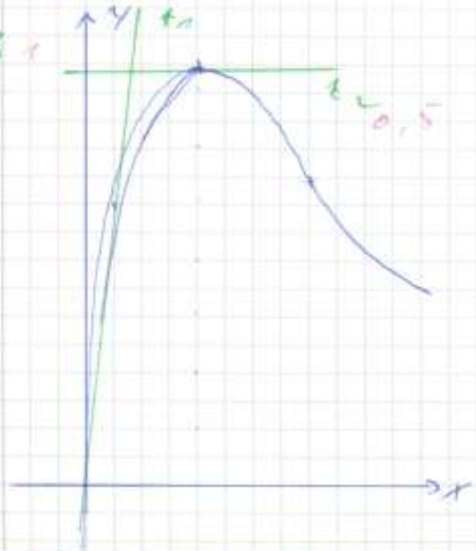
Lösung S. 2

$\boxed{a\ 2}$ $f'(x) = 0 \Rightarrow x = 2$

$f''(2) < 0$ $\quad H(2 \mid \frac{20}{e})$

$f''(x) = 0$ $\quad x = 4$ $\quad W(4 \mid \frac{40}{e^2})$

b 1



c) $\boxed{2}$ $f(0) = 0 = f(u)$

$u = 0$

$f'(0) = 10$

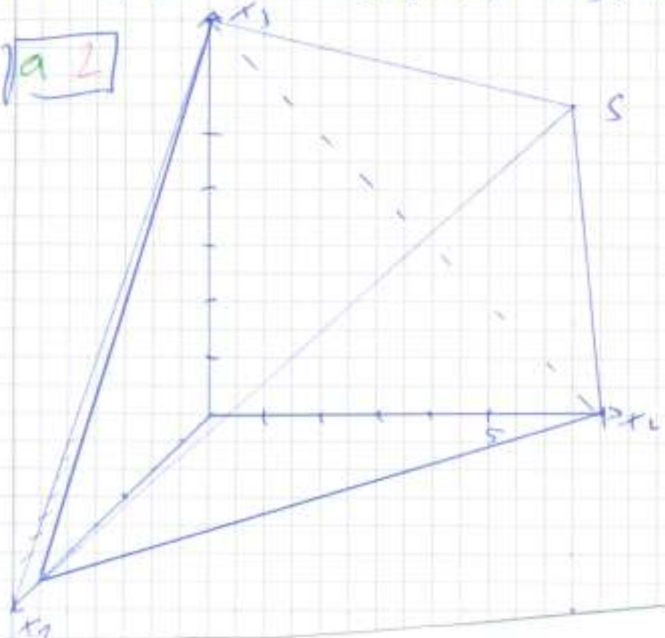
$y = 10 \cdot x$ 1 t_1

t_2 Tangente im HP

$y = 7{,}4$ 0,5

W7 $S_1(6|0|0)$ $S_2(0|7|0)$ $S_3(0|0|7)$ 1

$\boxed{a\ 2}$



1

W 7 b) Seite 3

$V = \frac{1}{3} A_G \cdot h$

$V = \frac{1}{3} \cdot \frac{1}{2} \cdot 6 \cdot 7 \cdot 7$ 1

$V = \underline{49}$ VE 1

F 3)

$g: \vec{x} = \begin{pmatrix} 7 \\ 10 \\ 9 \end{pmatrix} + r \begin{pmatrix} 7 \\ 6 \\ 6 \end{pmatrix}$

$h: \vec{x} = k \cdot \begin{pmatrix} 7 \\ 6 \\ 6 \end{pmatrix}$

g in E: $49 + 49r + 60 + 36r + 54 + 36r = 42$

$121r = -121$

$r = -1$

$\underline{D_G(0/4/3)}$ 1

h in E: $49r + 36r + 36r = 42$

$121r = 42$

$r = \frac{42}{121}$

$D_H(A/B/C) = \underline{(2,43/2,08/2,08)}$ 1

$|\overline{D_H D_G}| = \sqrt{A^2 + (B-4)^2 + (B-3)^2}$

$\underline{= 3,228 \text{ LE}}$ 1

W 8) $B(t) = 5 \cdot e^{k \cdot t}$ $2 = e^{7k}$ $k = \frac{\ln 2}{7}$

$k = 0,099$

a 2) $\underline{B(t) = 5 \cdot e^{0,099 t}}$ 1 1

c 1) $Y1 = 5 \cdot e^{0,1x}$

$Y2 = 13$ $x = 9,56$

Nach ca. 9 ½ Tagen

c 2) $Y3 = 0,068x^2 + 0,2374x + 5$

$Y4 = |Y1 - Y3|$

$NP_1 (3,4 / 0,43)$

$NP_2 (15,4 / 1,48)$ 1

$Y4(21) < 1,48$ $\underline{1,48 \cdot 10^6}$ 1