Name	Klasse	Datum		Seite Blatt
3. Schulaufgabe	B12T5	4.4.11		

② 1.1 $f_k(x) = \frac{x+5}{e^{0,5x}\cdot e^{k}} = \frac{1}{e^{k}} \cdot \frac{x+5}{e^{0,5x}}$ Vergrößerung bewirkt eine Stauchung in y-Ri.

③ 1.2 $f_k(-2) = 3 \Rightarrow \frac{-2+5}{e^{-1+k}} = 3 \Leftrightarrow e^{-1+k} = +1 \Leftrightarrow -1+k=0 \Rightarrow k=1$

⑤ 1.3 $f(x)=0 \Rightarrow x+5=0 \Rightarrow x_N = -5$; $N(-5/0)$ ∅

$f(0) = \frac{5}{e^{1}} = 5/e \Rightarrow S_y\,(0/5/e)$ ∅ $(5/e \approx 1{,}84)$

$x \to \infty$: $f(x) \to$ "$\frac{\infty}{\infty}$" also L.H $\frac{1}{0{,}5e^{0{,}5x+1}} \longrightarrow$ "$\frac{1}{\infty}$" $\rightarrow 0$

$x \to -\infty$: $f(x) \rightarrow$ "$\frac{-\infty}{0}$" $\rightarrow -\infty$

⑤ 1.4 $f'(x) = \frac{e^{0{,}5x+1}\cdot 1 - (x+5)e^{0{,}5x+1}\cdot 0{,}5}{(e^{0{,}5x+1})^2} = \frac{1-0{,}5x-2{,}5}{e^{0{,}5x+1}}$

$f'(x) = \frac{-x-3}{2e^{0{,}5x+1}} = 0 \Rightarrow x_E = -3$

$$\begin{array}{l|ccc} & & -3 & \\ \text{Vz } f' & + & 0 & - \\ & \text{smw} & \text{HOP} & \text{smf} \end{array}$$

$f(-3) = \frac{-3+5}{e^{-1{,}5+1}} = \frac{2}{e^{-0{,}5}} \Rightarrow \text{HOP}\,(-3/2\sqrt{e}) \approx \text{HOP}\,(-3/3{,}3)$

1.5 $f''(x) = \frac{2e^{0{,}5x+1}\cdot(-1) - (-x-3)\cdot 2e^{0{,}5x+1}\cdot 0{,}5}{4\cdot(e^{0{,}5x+1})^2}$

$f''(x) = \frac{-2+x+3}{4e^{0{,}5x+1}} = \frac{x+1}{4e^{0{,}5x+1}} = 0 \Rightarrow x_W = -1$

$f(-1) = \frac{4}{e^{0{,}5}} = \frac{4}{\sqrt{e}}$ ∅ $\approx 2{,}43$

$$\begin{array}{l|ccc} & & -1 & x \\ \text{Vz } f'' & - & 0 & + \\ G_f & \text{rekr} & \text{WEP} & \text{likr} \end{array}$$ ∅

$\Rightarrow \text{WEP}\,(-1/4/\sqrt{e})$

$f'(-1) = \frac{1-3}{2\sqrt{e}} = -\frac{1}{\sqrt{e}} \approx -0{,}61$

$t = \frac{4}{\sqrt{e}} - \left(-\frac{1}{\sqrt{e}}\cdot(-1)\right) = \frac{3}{\sqrt{e}} \approx 1{,}82$

$\Big\}\; t_W(x) = -\frac{1}{\sqrt{e}}x + \frac{3}{\sqrt{e}}$

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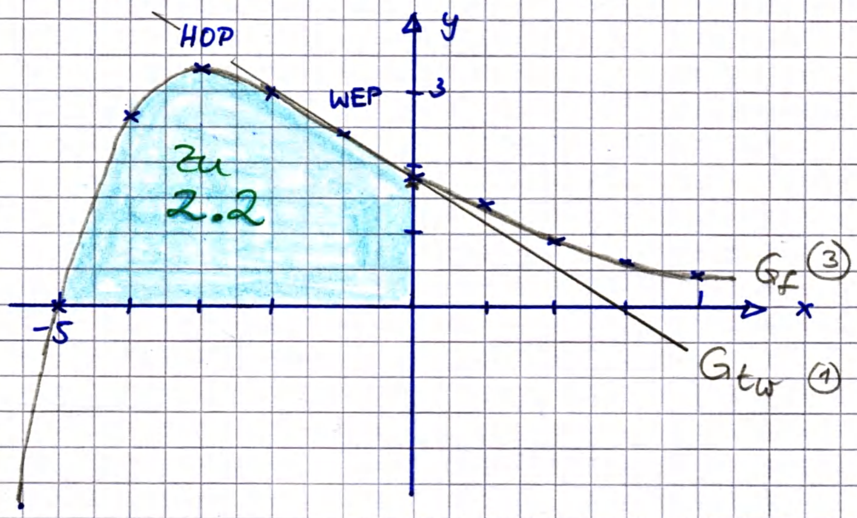
1.6 ④



1.7 ③ Geringste Steigung im WEP, also $m_{min} = -\frac{1}{\sqrt{e}}$ • •

und $m \in [-\frac{1}{\sqrt{e}} ; \infty[$ •, weil auch $f'(x) \to \infty$ fur $x \to -\infty$

2.1 ③ $F(x) = (ax + b)e^{-0,5x-1}$ [redacted]

$$F'(x) = a \cdot e^{-0,5x-1} + (-0,5) \cdot (ax + b) e^{-0,5x-1} \;•$$

$$= \frac{a - 0,5ax - 0,5b}{e^{0,5x+1}} \;ø$$

$$-0,5a = 1 \iff a = -2 \;ø$$

$$a - 0,5b = 5 \Rightarrow 0,5b = a - 5 = -2 - 5 \Rightarrow b = -14$$

2.2. ④ $$I = \int_{-5}^{0} f(x)\,dx = \left[(-2x - 14)e^{-0,5x-1}\right]_{-5}^{0}$$

$$= -14e^{-1} - (+10 - 14)e^{2,5-1} =$$

$$= -14e^{-1} + 4e^{1.5} \quad (\approx -5,15 + 17,93 \approx 12,78)$$

• Mark

Name	Klasse	Datum		Seite Blatt
3. Schulaufgabe	B12TS	4.4.11		

3.1 ⑤

$\overrightarrow{B_kA} = \begin{pmatrix} 20 \\ 0 \\ 10k \end{pmatrix}$; $\overrightarrow{AC_k} = \begin{pmatrix} -18 \\ 2 \\ 2-9k \end{pmatrix}$ E_0 : enthält x_1 – Achse

$$\begin{pmatrix} 20 \\ 0 \\ 10k \end{pmatrix} \times \begin{pmatrix} -18 \\ 2 \\ 2-9k \end{pmatrix} = \begin{pmatrix} -20k \\ -180k - 20\cdot(2-9k) \\ 40 \end{pmatrix} = \begin{pmatrix} -20k \\ -40 \\ 40 \end{pmatrix} = -20 \begin{pmatrix} k \\ 2 \\ -2 \end{pmatrix}$$

$$E_k : \vec{n}(\vec{x} - \vec{a}) = \begin{pmatrix} k \\ 2 \\ -2 \end{pmatrix} \circ \begin{pmatrix} x_1 - 20 \\ x_2 - 0 \\ x_3 - 0 \end{pmatrix} = \underline{kx_1 + 2x_2 - 2x_3 - 20k = 0}$$

3.2 ⑤

$E_k : kx_1 - 2x_2 + 2x_3 - 20k = 0$ $kx_1 - 20k = 0 \Rightarrow x_1 = 20$

$E_0 : \quad -2x_2 + 2x_3 = 0$; $x_2 = x_3 = \alpha$

$x_1 = 20$

$x_2 = \alpha \quad \Rightarrow \quad \underline{s : \vec{x} = \begin{pmatrix} 20 \\ 0 \\ 0 \end{pmatrix} + \alpha \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}}$ E_k: „Büschel" durch die Schnittgerade

$x_3 = \alpha$

3.3 ⑤

$S_2 : x_1 = x_3 = 0 \Rightarrow -2x_2 - 20k = 0 \Rightarrow x_2 = -10k$

$\underline{S_2 (0 | -10k | 0)}$

$$V = \frac{1}{6} \left| |\vec{a}| \cdot |\vec{s}_2| \cdot |\vec{b}_k| \right| = \frac{1}{6} \cdot 20 \cdot |-10k| \cdot |-10k| = \frac{2000}{6} k^2$$

$$\frac{2000}{6} k^2 = 500 \Leftrightarrow k^2 = \frac{3}{2} \Rightarrow \underline{k_{1/2} = \pm\sqrt{3/2} = \pm \frac{1}{2}\sqrt{6}}$$

3.4 ⑥

Hilfslot d. Urspr. : $\ell : \vec{x} = \lambda \begin{pmatrix} 3 \\ -2 \\ 2 \end{pmatrix}$ in E_3

$3 \cdot 3\lambda - 2 \cdot (-2\lambda) + 2 \cdot 2\lambda - 60 = 0 \Leftrightarrow 17\lambda = 60 \Leftrightarrow \lambda = \frac{60}{17}$

Lotfuß : $\vec{L} = \frac{60}{17} \begin{pmatrix} 3 \\ -2 \\ 2 \end{pmatrix}$

$$d = |\vec{L}| = \frac{60}{17} \cdot \sqrt{9+4+4} = \frac{60\sqrt{17}}{17} \approx \underline{14{,}55 > 10 \text{ [LE]}}$$

Also: Hinteres Ende am Ursprung schon vorbei.