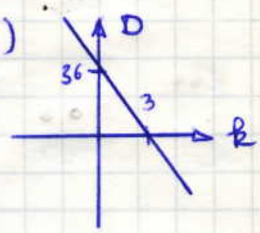
B12TS   1. Schulaufgabe am 27.11.09

1.1. $f_k'(x) = \frac{3}{2}x^2 - 3x + \frac{1}{2}k = 0 = \frac{1}{2}(3x^2 - 6x + k)$

$D = 36 - 4 \cdot 3 \cdot k = 36 - 12k = -12(k-3)$



(6) D > 0 für k < 3   2 Hor. Tang bei Extrema

D = 0 für k = 3   1 Hor. Tang bei TEP

1.2 $m = f_k'(3) = \frac{1}{2}\cdot(3\cdot 9 - 6\cdot 3 + k) = \frac{1}{2}(9+k) = \frac{9}{2} + \frac{1}{2}k$

$f(3) = \frac{1}{2}\cdot 27 - \frac{3}{2}\cdot 9 + \frac{3}{2}k + 2 = \frac{3}{2}k + 2$

(5) $b = \frac{3}{2}k + 2 - 3\left(\frac{9}{2} + \frac{1}{2}k\right) = \frac{3}{2}k - \frac{3}{2}k + 2 - \frac{27}{2} = -\frac{23}{2}$

$t_k(x) = \frac{1}{2}(9+k)x - \frac{23}{2} = \frac{1}{2}kx + \frac{9}{2}x - 11{,}5$

Büschel durch B(0|−11,5)

1.3 $b = y - mx = f(x_0) - f'(x_0)\cdot x_0$

$\Rightarrow 2 = \frac{1}{2}x_0^3 - \frac{3}{2}x_0^2 + \frac{1}{2}kx_0 + 2 - \left(\frac{3}{2}x_0^2 - 3x_0 + \frac{1}{2}k\right)x_0$

(5) $\Leftrightarrow -x_0^3 + \frac{3}{2}x_0^2 = 0 \Leftrightarrow -x_0^2(x_0 - 3/2) = 0$

$x_1 = 0$ erste Stelle ; $x_2 = 3/2$ ist 2. Stelle

2.1. $f(x) = \frac{1}{2}x^3 - \frac{3}{2}x^2 + 2 = \frac{1}{2}(x^3 - 3x^2 + 4)$

(6) $f'(x) = \frac{1}{2}(3x^2 - 6x) = \frac{3}{2}x(x-2) = 0$; $x_1 = 0$, $x_2 = 2$ } 1-f. NST

$f(0) = 2 \Rightarrow$ HOP (0|2)

VZ f'   +   0   −   0   +

G_f sms   HOP   smf   TIP   sms

$f(2) = 0 \Rightarrow$ TIP (2|0)

2.2. $(x^3 - 3x^2 + 4) : (x-2) = x^2 - x - 2 = (x-2)(x+1)$

$-(x^3 - 2x^2)$

x^2

$-(x^2 + 2x)$

$-2x + 4$

$-(2x + 4)$

— —

(5) $f(x) = \frac{1}{2}(x-2)^2(x+1)$

3.1 $\frac{1}{2}x^4 + \frac{1}{2}x^3 = \frac{1}{2}x^3 - \frac{3}{2}x^2 + 2 \Leftrightarrow \frac{1}{2}x^4 + \frac{3}{2}x^2 - 2 = 0$

(6) $\Leftrightarrow x^4 + 3x^2 - 4 = 0 \Leftrightarrow u^2 + 3u - 4 = 0$ (Subst.)

$\Leftrightarrow (u+4)(u-1) = 0$ $f(1) = 2 \Rightarrow S_1(1|2)$

$u_1 = -4$ $u_2 = 1$ $f(-1) = 0 \Rightarrow S_2(-1|0)$

$x_{1/2} = -4$ ↯ $x_{3/4} = \pm 1$ (Resubst)

B12T5 1. Schulaufgabe am 27. 11. 09

4.)

$$\left(\begin{array}{ccc|c} \overset{2}{1} & \overset{2a}{a} & \overset{2a^2}{a^2} & \overset{8a}{4a} \\ 0 & 1 & a & 2 \\ 2 & 1+2a & 5a & 6a+6 \end{array}\right) \begin{array}{l} |\cdot 2 \\ \text{III} \cdot 2 \cdot \text{I} \\ \end{array}$$

$$\left(\begin{array}{ccc|c} 1 & a & a^2 & 4a \\ 0 & 1 & a & 2 \\ 0 & 1 & 5a-2a^2 & -2a+6 \end{array}\right) \quad \text{III} - \text{II}$$

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$$\left(\begin{array}{ccc|c} 1 & a & a^2 & 4a \\ 0 & 1 & a & 2 \\ 0 & 0 & 4a-2a^2 & -2a+4 \end{array}\right) \Leftrightarrow 2a(2-a)x_3 \doteq 2(2-a)$$

1. Fall: $a=0$: $0x_3 = 4$ ↯ keine Lsg
2. Fall: $a=2$: $0x_3 = 0$ ∞ viele Lsgen
3. Fall: $a \in \mathbb{R} \setminus \{0;2\}$: genau eine Lsg.

3.)

$x_1 + x_2 + x_3 = 5$

$kx_3 = 9$

$x_3 = k$

$k^2 = 9 \Leftrightarrow k_{1/2} = \pm 3$ also $k = -3$ (da $k \in \mathbb{R}_0^-$)

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$x_1 + x_2 + x_3 = 5$

$x_3 = -3$

$\Rightarrow x_1 + x_2 = 8$; Setze $x_2 = \alpha$

$x_1 = 8 - \alpha$

$L = \{(8-\alpha \mid \alpha \mid -3)\}$

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