S 220 Nr. 2

$f(x) = ax^3 + bx^2 + cx + d$

Da f Punktsymmetrisch zum Ursprung $\Rightarrow$ nur ungerade Exponenten

$\Rightarrow \underline{b=0} \wedge \underline{d=0}$

$f(x) = ax^3 + cx$; $f'(x) = 3ax^2 + c$

Aus Tiefpunkt an der Stelle 1 $\Rightarrow f'(1) = 3a \cdot 1^2 + c = 0$

aus A(2|2) ist Element des Schaubildes $\Rightarrow f(2) = a \cdot 2^3 + c \cdot 2 = 2$

$\Rightarrow$ LGS

$$\begin{array}{rl} 3a + c = 0 & | \cdot 2 \\ 8a + 2c = 2 & | \cdot (-1) \\ \hline 3a + c = 0 & \Rightarrow 3 \cdot 1 + c = 0 \Rightarrow \underline{\underline{c = -3}} \\ -2a = -2 & \Rightarrow \underline{\underline{a = 1}} \end{array}$$

$\underline{\underline{f(x)}} = 1 \cdot x^3 + 0 \cdot x^2 - 3x + 0 = \underline{\underline{x^3 - 3x}}$

S 220 Nr. 3

a) $f(x) = ax^2 + bx + c$; $A(-1|-3)$; $B(1|1)$; $C(-2|1)$

$$\left.\begin{array}{l} A: f(-1) = a \cdot (-1)^2 + b \cdot (-1) + c = -3 \\ B: f(1) = a \cdot 1^2 + b \cdot 1 + c = 1 \\ C: f(-2) = a \cdot (-2)^2 + b \cdot (-2) + c = 1 \end{array}\right\} \Rightarrow \left(\begin{array}{ccc|c} 1 & -1 & 1 & -3 \\ 1 & 1 & 1 & 1 \\ 4 & -2 & 1 & 1 \end{array}\right) \text{ mit GTR}$$

$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -3 \end{array}\right) \Rightarrow a = 2 ; b = 2 ; c = -3$$

$\underline{\underline{f(x) = 2x^2 + 2x - 3}}$

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b) $f(x) = ax^2 + bx + c$; $A(2|0)$; $B(-2|0)$

$$\left.\begin{array}{l} f(2) = a \cdot 2^2 + b \cdot 2 + c = 0 \\ f(-2) = a \cdot (-2)^2 + b(-2) + c = 0 \end{array}\right\} \Rightarrow \begin{array}{rl} 4a + 2b + c = 0 & | \cdot 1 \\ 4a - 2b + c = 0 & | \cdot (-1) \\ \hline 4a + 2b + c = 0 & \\ 4b = 0 & \Rightarrow \underline{b = 0} \\ \hline 4a + 2 \cdot 0 + c = 0 & \Rightarrow \underline{a = -\frac{c}{4}} \end{array}$$

Für $c = t \Rightarrow a = -\frac{t}{4} \Rightarrow \underline{\underline{f(x) = -\frac{t}{4}x^2 + t}}$

oder $f(x) = k \cdot (x-2)(x+2) = k \cdot (x^2 - 4) = kx^2 - 4k$ für $-4k = t$