S 220 Nr. 6

$f(x) = ax^3 + bx^2 + cx + d$; $A(2|0) \Rightarrow f(2) = 0$

$f'(x) = 3ax^2 + 2bx + c$; $\overset{\shortparallel}{W}(2|0) \Rightarrow f''(2) = 0$

$f''(x) = 6ax + 2b$; $H(3|f(3)) \Rightarrow f'(3) = 0$

$$\begin{aligned}
A:&\quad f(2) = a\cdot 2^3 + b\cdot 2^2 + c\cdot 2 + d = 0\\
W{=}A:&\quad f''(2) = 6a\cdot 2 + 2b = 0\\
H:&\quad f'(3) = 3a\cdot 3^2 + 2b\cdot 3 + c = 0
\end{aligned}$$

$$\begin{aligned}
8a + 4b + 2c + d &= 0\\
12a + 2b &= 0\\
27a + 6b + c &= 0
\end{aligned}$$

$12a = -2b \Rightarrow a = -\frac{1}{6}b$

Für $\underline{\underline{b = t}} \Rightarrow \underline{\underline{a = -\frac{1}{6}t}}$

aus III $\quad 27\cdot(-\frac{1}{6}t) + 6\cdot t + c = 0 \Rightarrow \underline{\underline{c = -\frac{3}{2}t}}$

aus I $\quad 8\cdot(-\frac{1}{6}t) + 4\cdot t + 2\cdot(-\frac{3}{2}t) + d = 0 \Rightarrow \underline{\underline{d = \frac{1}{3}t}}$

$$\underline{\underline{f(x) = -\frac{1}{6}t\cdot x^3 + t\cdot x^2 - \frac{3}{2}t\cdot x + \frac{1}{3}t \quad ; \quad t \in \mathbb{R}}}$$

oder wenn $\frac{1}{3}t = k$ gesetzt wird $\Rightarrow t = 3k$

$f(x) = -\frac{1}{6}\cdot(3k)\cdot x^3 + (3k)\cdot x^2 - \frac{3}{2}\cdot(3k)\cdot x + \frac{1}{3}\cdot(3k)$

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

$$\underline{\underline{f(x) = k\cdot\left(-\frac{1}{2}x^3 + 3x^2 - \frac{9}{2}x + 1\right)}} \quad ; \quad k \in \mathbb{R}$$