S221 Nr. 11 a

$f(x) = ax^4 + bx^3 + cx^2 + dx + e$

$f'(x) = 4ax^3 + 3bx^2 + 2cx + d$

$f''(x) = 12ax^2 + 6bx + 2c$

W(0|0) $\quad f(0) = a\cdot 0^4 + b\cdot 0^3 + c\cdot 0^2 + d\cdot 0^1 + e = 0$

Wendetangente x-Achse $\quad f'(0) = 4a\cdot 0^3 + 3b\cdot 0^2 + 2c\cdot 0 + d = 0$

notw. Bed Wendepunkt $\quad f''(0) = 12a\cdot 0^2 + 6b\cdot 0 + 2c = 0$

T(-1|-2) $\quad f(-1) = a\cdot(-1)^4 + b\cdot(-1)^3 + c\cdot(-1)^2 + d\cdot(-1) + e = -2$

notw. Bed. Tiefpunkt $\quad f'(-1) = 4a\cdot(-1)^3 + 3b\cdot(-1)^2 + 2c\cdot(-1) + d = 0$

$$\left(\begin{array}{ccccc|c} 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 \\ 1 & -1 & 1 & -1 & 1 & -2 \\ -4 & 3 & -2 & 1 & 0 & 0 \end{array}\right) \Rightarrow \text{mit GTR}$$

$$\left(\begin{array}{ccccc|c} 1 & 0 & 0 & 0 & 0 & 6 \\ 0 & 1 & 0 & 0 & 0 & 8 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{array}\right) \Rightarrow \underline{\underline{f(x) = 6x^4 + 8x^3}}$$

11c) $f(x) = ax^4 + cx^2 + e$ aus der Symmetrie zur y-Achse

$f'(x) = 4\cdot ax^3 + 2cx$

A(0|2) : $\quad f(0) = a\cdot 0^4 + c\cdot 0^2 + e = 2$

T(1|0) : $\quad f(1) = a\cdot 1^4 + c\cdot 1^2 + e = 0$

notw. Bed. Tiefp. $\quad f'(1) = 4a\cdot 1^3 + 2\cdot c\cdot 1 = 0$

$$\Rightarrow \left(\begin{array}{ccc|c} 0 & 0 & 1 & 2 \\ 1 & 1 & 1 & 0 \\ 4 & 2 & 0 & 0 \end{array}\right)$$

$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -4 \\ 0 & 0 & 1 & 2 \end{array}\right) \Rightarrow \underline{\underline{f(x) = 2x^4 - 4x^2 + 2}}$$