

39/10, 11a, 13 LB

H7

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

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

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

O: $f(0) = 0 = e$

A: $f(-1) = -2 = a - b + c - d + e$

WP: $f''(0) = 0 = 2c$

EP: $f'(-1) = 0 = -4a + 3b - 2c + d$

WL x-A: $f'(0) = 0 = d$

~ I) $-2 = a - b$

II) $0 = -4a + 3b$

I' $a = -2 + b$

in II) $0 = -4(-2 + b) + 3b$

$$0 = 8 - 4b + 3b$$

$$0 = 8 - b$$

$b = 8$ ~ $a = 6$

$$L = \{(a, b, c, d, e); (6/8/0/0/0)\}$$

~ $f(x) = 6x^4 + 8x^3$

10 b) O: $f(0) = 0 = e$

W: $f(-2) = 2 = 16a - 8b + 4c - 2d + e$

WP: $f''(-2) = 0 = 48a - 12b + 2c$

Tu O: $f'(0) = 0 = d$

Tu W: $f'(-2) = 0 = -32a + 12b - 4c + d$

~ I) $2 = 16a - 8b + 4c$

II) $0 = 48a - 12b + 2c$ $L = \{(a, b, c); (\frac{3}{8}/2/3)\}$

III) $0 = -32a + 12b - 4c$ $f(x) = \frac{3}{8}x^4 + 2x^3 + 3x^2$

HA

①

5. 89/10 b) $f(x) = ax^4 + 5x^3 + cx^2 + dx + e$; $f'(x)$; $f''(x)$

geg.: Punkt O: $f(0) = 0 = e$

Punkt W: $f(-2) = 2 = 16a - 8b + 4c - 2d + e$

WA: $f''(-2) = 0 = 48a - 12b + 2c$

Tang. in O: $f'(0) = 0 = d$

Tang. in W: $f'(-2) = 0 = -32a + 12b - 4c + d$

→ Vereinfacht:	$2 = 16a - 8b + 4c$	$\wedge a = \frac{3}{8}$ $b = 2$ $c = 3$
	$0 = 48a - 12b + 2c$	
	$0 = -32a + 12b - 4c$	

$\wedge$ $f(x) = \frac{3}{8}x^4 + 2x^3 + 3x^2$

5. 85/11 a) $f(x) = ax^4 + bx^2 + c$ (symm. zur y-Achse!)

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

$f''(x) = 12ax^2 + 2b$

geg.: Punkt A: $f(0) = 2 = c$

Punkt B: $f(1) = 0 = a + b + c$

Extrem. B: $f'(1) = 0 = 4a + 2b$

Vereinfacht:	$-2 = a + b$	$\wedge a = -2 - b$
	<u>$0 = 4a + 2b$</u>	$\wedge 0 = 4(-2 - b) + 2b$ $0 = -8 - 2b$

$\wedge b = -4$; $a = 2$

$\wedge f(x) = 2x^4 - 4x^2 + 2$

13)

②

geg.: $f(x) = ax^2 + bx + c$; $A(0|0)$; $B(50|10)$

$$f'(x) = 2ax + b$$

$$A: f(0) = 0 = c$$

$$B: f(50) = 10 = 2500a + 50b + c$$

$$\text{TäB: } f'(50) = 1 = 100a + b$$

$$L = \{(a, b, c); (\frac{2}{125} | -\frac{3}{5} | 0)\}$$

a) $\rightarrow \underline{f(x) = \frac{2}{125}x^2 - \frac{3}{5}x}$

b) T: Talpunkt: $f'(x) = \frac{4}{125}x - \frac{3}{5}$

u. B: $0 = \frac{4}{125}x - \frac{3}{5}$

$$x_E = \frac{75}{4} \rightarrow \underline{P_T(\frac{75}{4} | -\frac{45}{8})}$$

①: d $\rightarrow$ Max Gerade: $y = \frac{1}{5}x$

$$d = g(x) = \frac{1}{5}x - \left(\frac{2}{125}x^2 - \frac{3}{5}x\right)$$

$$x_E = 25 \rightarrow \underline{d_{\max} = 10 \text{ m}}$$
