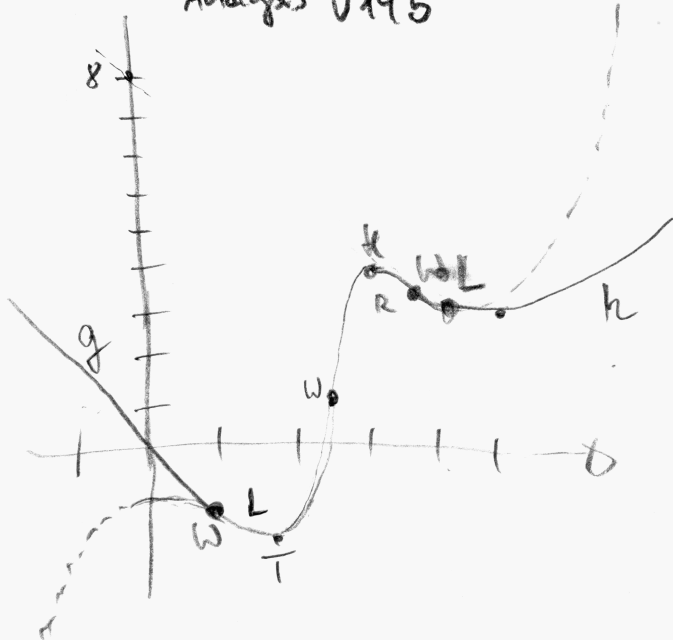


temporal Mathematik Seite 12
 Analysis 014b



Funktion S. Greder, wol

- ~~wol~~ 4 Extrempunkte
- 3 Wendepunkte

$$g(x) = -x \quad \text{für } x \leq 1$$

$$h(x) = 0,2(x-5)^2 + 3 \quad \text{für } x \geq 4$$

$$= 0,2x^2 - 2x + 8$$

$$h'(x) = 0,4x - 2$$

$$h''(x) = 0,4$$

$$f(x) = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$$

$$f'(x) = 5ax^4 + 4bx^3 + 3cx^2 + 2dx + e$$

$$f''(x) = 20ax^3 + 12bx^2 + 6cx + 2d$$

$$f'''(x) = 60ax^2 + 24bx + 6c$$

$$W(1/-1) \begin{cases} f(1) = -1 = g(1) \Rightarrow a + b + c + d + e + f = -1 \\ f'(1) = -1 = g'(1) \Rightarrow 5a + 4b + 3c + 2d + e = -1 \\ f''(1) = 0 \Rightarrow 20a + 12b + 6c + 2d = 0 \\ \wedge f'''(1) > 0 \Rightarrow 60a + 24b + 6c > 0 \end{cases}$$

$$P(4/3,2) \begin{cases} f(4) = 3,2 = h(4) \Rightarrow 4^5a + 4^4b + 4^3c + 4^2d + 4e + f = 3,2 \\ f'(4) = h'(4) = \frac{-0,4}{1} \Rightarrow 5 \cdot 4^4a + 4 \cdot 4^3b + 3 \cdot 4^2c + 8d + e = \frac{-0,4}{1} \\ f''(4) = h''(4) = \frac{0,4}{1} \Rightarrow 20 \cdot 4^3a + 12 \cdot 4^2b + 24c + 2d = \frac{0,4}{1} \end{cases}$$

$$\begin{pmatrix} 4^5 & 4^4 & 4^3 & 4^2 & 4 & 1 & 3,2 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 \\ 5 \cdot 4^4 & 4 \cdot 4^3 & 3 \cdot 4^2 & 8 & 1 & 0 & -0,4 \\ 5 & 4 & 3 & 2 & 1 & 0 & -1 \\ 20 \cdot 4^3 & 12 \cdot 4^2 & 24 & 2 & 0 & 0 & 0,4 \\ 20 & 12 & 6 & 2 & 0 & 0 & 0 \end{pmatrix}$$

richtig \Rightarrow

$$\begin{cases} a = 22/135 \approx 0,163 \\ b = -55/27 \approx -2,037 \\ c = 1213/135 \approx 8,985 \\ d = -2209/135 \approx -16,363 \\ e = 1634/135 \approx 12,104 \\ f = -104/27 \approx -3,852 \end{cases}$$

Hinw Prüfung:

$$f'''(1) = 60 \cdot \frac{22}{135} - 24 \cdot \frac{55}{27} + 6 \cdot \frac{1213}{135}$$

$$= \frac{1}{35} (60 \cdot 22 - 120 \cdot 55 + 6 \cdot 1213) = \frac{1}{35} \cdot 1998 > 0 \quad \checkmark$$

$$f(x) = \frac{22}{135}x^5 - \frac{55}{27}x^4 + \frac{1213}{135}x^3 - \frac{2209}{135}x^2 + \frac{1634}{135}x - \frac{104}{27}$$