

3. Schulübung

Entscheidung Max/Min

$$f(x) = 4x^3 + 45x^2 - 48x + 6$$

$$f'(x) = 12x^2 + 90x - 48 = 0$$

$$2x^2 + 15x - 8 = 0$$

$$x_{1,2} = \frac{-15 \pm \sqrt{225 + 64}}{4} = \frac{-15 \pm 17}{4}$$

$$\underline{x_1 = -8 \quad x_2 = 0,5} \rightarrow \text{Einsetzen in 2. Ableitung}$$

Ableitung der Ableitung:

$$f''(x) = 24x + 30$$

$$f''(-8) = -102 \Rightarrow \text{Maximum}$$

$$f''(0,5) = 102 \Rightarrow \text{Minimum}$$

$f'(x) = 0 \wedge f''(x) < 0 \Rightarrow \text{Maximum (H)}$
$f'(x) = 0 \wedge f''(x) > 0 \Rightarrow \text{Minimum (T)}$
$f''(x) = 0 \Rightarrow \text{Wendepunkt (später)}$

$$1) f(x) = 5x^3 - 36x^2 - 15x + 12$$

$$f'(x) = 15x^2 - 72x - 15$$

$$f''(x) = 30x - 72$$

$$E: 15x^2 - 72x - 15 = 0 \quad | : 3$$

E ... Extremwert

$$5x^2 - 24x - 5 = 0$$

$$x_{1,2} = \frac{24 \pm \sqrt{576 + 100}}{10} = \frac{24 \pm 26}{10}$$

$$\underline{x_1 = -0,2 \quad x_2 = 5} \rightarrow f''$$

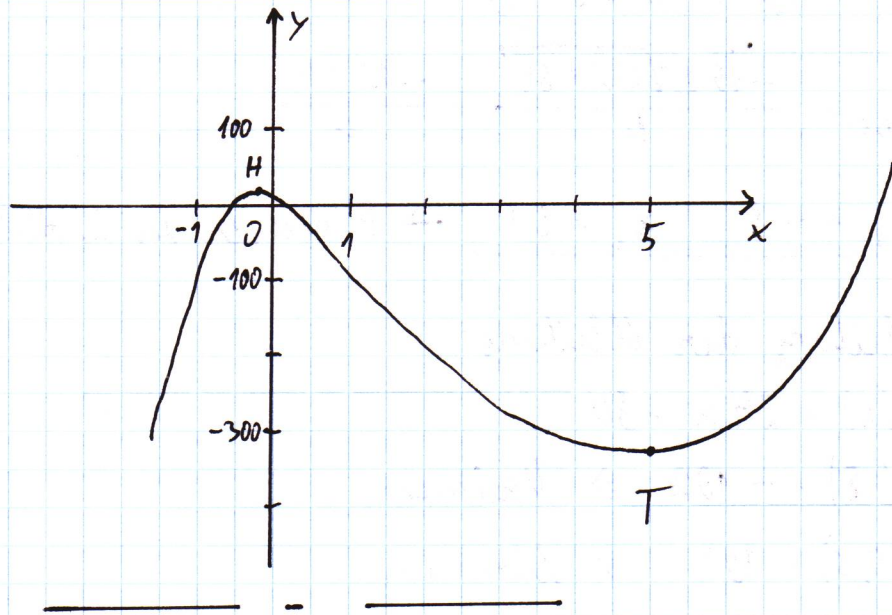
$$f''(-0,2) = -78 \Rightarrow H$$

$$f''(5) = 78 \Rightarrow T$$

$$y\text{-Koordinaten: } f(-0,2) = 13,52$$

$$f(5) = -338$$

$$\underline{H = (-0,2 | 13,52) \quad T = (5 | -338)}$$



$$\bullet) f(x) = x^3 - 6x^2 + 12x + 6$$

$$f'(x) = 3x^2 - 12x + 12$$

$$\underline{f''(x) = 6x - 12}$$

$$E: 3x^2 - 12x + 12 = 0 \quad | : 3$$

$$x^2 - 4x + 4 = 0$$

$$x_{1,2} = 2 \pm \sqrt{4-4} = 2$$

$$f''(2) = 0 \Rightarrow \text{Wendepunkt}$$

$$f(2) = 14$$

$$\underline{W = (2 | 14)}$$