S. 77/3. a)

$f(x) = \frac{1}{2}x^3 - 4x^2 + 8x = x(0{,}5x^2 - 4x + 8)$

$\mathbb{D} = \mathbb{R}$

$f(-x) = \frac{1}{2}(-x)^3 - 4\cdot(-x)^2 + 8\cdot(-x) = -\frac{1}{2}x^3 - 4x^2 - 8x \neq -f(x) \neq f(x)$

$\Rightarrow$ keine Symmetrie

$f(x) = 0$

$\frac{1}{2}\cdot x^3 - 4x^2 + 8x = 0$

$x(\frac{1}{2}x^2 - 4x + 8) = 0$

$x_2 = \frac{4 \pm \sqrt{16 - 16}}{1} = 4 \pm \sqrt{0} = 4$

$x_1 = 0 \quad ; x_2 = 4 \quad \Rightarrow S_{x_1}(0|0) \; ; S_{x_2}(4|0)$

$f(0) = \frac{1}{2}\cdot 0^3 - 4\cdot 0^2 + 8\cdot 0 = 0 \Rightarrow S_y(0|0)$

$\Rightarrow \mathbb{D} = \mathbb{R}$, also keine Asymptoten

$\lim\limits_{x \to +\infty} f(x) = \underbrace{\frac{1}{2}x^3 - 4x^2 + 8x}_{\to \infty} = \infty$

$\lim\limits_{x \to -\infty} f(x) = \underbrace{\frac{1}{2}x^3 - 4x^2 + 8x}_{\to -\infty} = -\infty$

$f'(x) = 1{,}5x^2 - 8x + 8$

$f'(x) = 0$

$1{,}5x^2 - 8x + 8 = 0$

$x'_{1/2} = \frac{8 \pm \sqrt{64 - 48}}{3} = \frac{8 \pm \sqrt{16}}{3} = \frac{8 \pm 4}{3} \Rightarrow x'_1 = \frac{8+4}{3} = \frac{12}{3} = 4$

$x'_2 = \frac{8-4}{3} = \frac{4}{3} (= 1{,}\overline{3})$

x	$-\infty < x < \frac{4}{3}$	$x = \frac{4}{3}$	$\frac{4}{3} < x < 4$	$x = 4$	$4 < x < \infty$
$f'(x)$	+	0	−	0	+
$f(x)$	sms	Max $(\frac{4}{3} \mid 4{,}74)$	sm	Min $(4 \mid 0)$	sms

lok. Max.

$\cancel{f(\tfrac{4}{3}) = 1{,}5 \cdot (\tfrac{4}{3})^2 - 8 \cdot (\tfrac{4}{3}) + 8 = 0}$

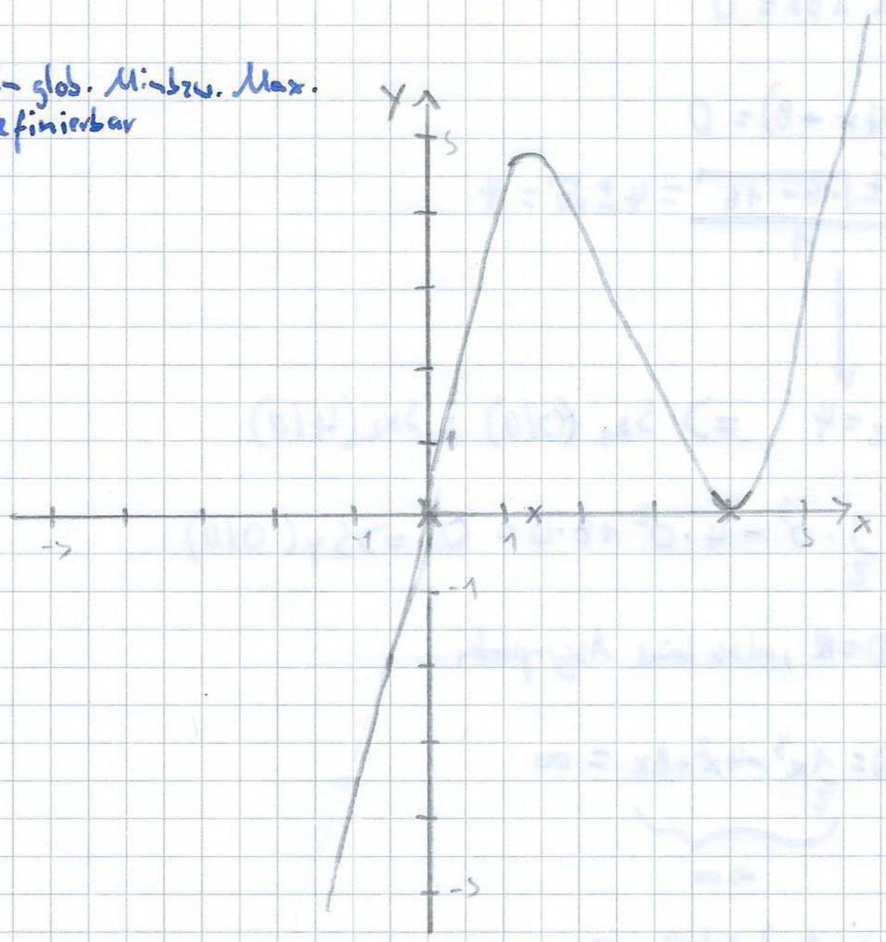
$f(\frac{4}{3}) = \frac{1}{2}(\frac{4}{3})^3 - 4(\frac{4}{3})^2 + 8 \cdot \frac{4}{3} = 4\frac{20}{27} \approx 4{,}74$

$\cancel{f(4) = 1{,}5 (4)^2 - 8 \cdot 4 + 8 = 0}$

$f(4) = \frac{1}{2}(4)^3 - 4 \cdot (4)^2 + 8 \cdot 4 = 0$

lok. Min.

=) kein glob. Min bzw. Max. definierbar



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