S 77/6 a

$f(x) = \frac{1}{6}x^3 - 3x^2 + 2x$

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

2) Achsensymmetrie: $f(x) = f(-x) \Rightarrow f(-x) = -\frac{1}{6}x^3 - 3x^2 - 2x \neq f(x)$

Punktsymmetrie: $f(-x) = -f(x) \Rightarrow -f(x) = -(\frac{1}{6}x^3 - 3x^2 + 2x)$

$= -\frac{1}{6}x^3 + 3x^2 - 2x \neq f(-x)$

$\Rightarrow$ keine Symmetrien

3) Nullstellen: $f(x) = 0 \Leftrightarrow \frac{1}{6}x^3 - 3x^2 + 2x = 0$

$x(\frac{1}{6}x^2 - 3x + 2) = 0 \quad \Rightarrow x_3 = 0$

Lösungsformel $x_{1/2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{3 \pm \sqrt{(-3)^2 - 4 \cdot \frac{1}{6} \cdot 2}}{2 \cdot 1/6}$

$= \frac{3 \pm \sqrt{9 - \frac{4}{3}}}{1/3}$

$\Rightarrow x_1 \approx 17,3 \qquad x_2 \approx 0,7$

4) $f(0) = 0$

Verhalten im Unendlichen: $\lim\limits_{x \to \infty} \frac{1}{6}x^3 - 3x^2 + 2x = \infty$

$\lim\limits_{x \to -\infty} \frac{1}{6}x^3 - 3x^2 + 2x = -\infty$

5) $f'(x) = \frac{1}{2}x^2 - 6x + 2$

Monotonie $f'(x) = 0 \Leftrightarrow \frac{1}{2}x^2 - 6x + 2 = 0 \Rightarrow$ Lösungsformel

$x_{4/5} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

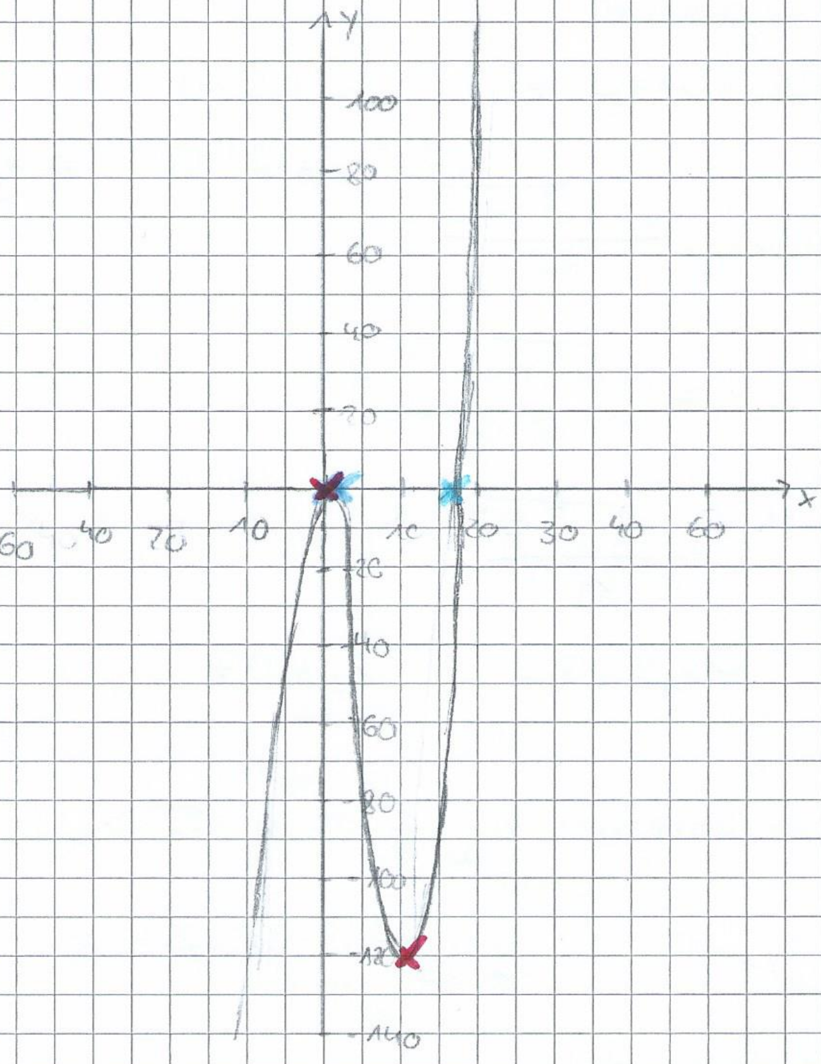
$= \frac{6 \pm \sqrt{(-6)^2 - 4 \cdot \frac{1}{2} \cdot 2}}{2 \cdot 1/2}$

$= \frac{6 \pm \sqrt{36 - 4}}{1}$

$x_4 \approx 11,7 \qquad x_5 \approx 0,3$

$6-\sqrt{32}$ | $6-\sqrt{32}$ | $6-\sqrt{x}$ | $6+\sqrt{32}$ | $6+\sqrt{32}$ | $6+\sqrt{32}$

x	$x<0{,}3$	$x=0{,}3$	$0{,}3<x<11{,}7$	$x=11{,}7$	$x>11{,}7$
$f'(x)$	+	0	−	0	+
$f(x)$	sms ↗	Max (0,3/0,3345)	smf ↘	Min (11,7/-120,3345)	sms ↗



● = Maximum & Minimum
● = Nullstellen