Kurven Aufgabe 38

$f_{(x)} = (x^2 - x - 6) * (x - 1) = x^3 - 2x^2 - 5x + 6$

$f'_{(x)} = 3x^2 - 4x - 5$, $f''_{(x)} = 6x - 4$, $f'''_{(x)} = 6$

Definitionsbereich: **$-\infty < x < \infty$**

Wertebereich: **$-\infty < f_{(x)} < \infty$**

Asymptoten: -

Symmetrie zur y-Achse bzw. zum Punkt (0|0):

$f_{(-x)} = (-x)^3 - 2(-x)^2 - 5(-x) + 6$

$f_{(-x)} = -x^3 - 2x^2 + 5x + 6 \neq f_{(x)}$

---> **keine Achsensymmetrie**

$-f_{(-x)} = -(-x^3 - 2x^2 + 5x + 6)$

$-f_{(-x)} = x^3 + 2x^2 - 5x - 6 \neq f_{(x)}$

---> **keine Punktsymmetrie**

Nullstellen:

$f_{(x)} = 0$

$x^3 - 2x^2 - 5x + 6 = 0$

Durch Probieren gefunden x = 1.

Hornerschema:

	1	-2	-5	6
$x_1 = 1$		1	-1	-6
	1	-1	-6	0

Polynomdivision:

$$x^3 - 2x^2 - 5x + 6 : (x - 1) = x^2 - x - 6$$
$$-(x^3 - x^2)$$
$$\text{----------}$$
$$-x^2 - 5x + 6$$
$$-(-x^2 + x)$$
$$\text{----------}$$
$$-6x + 6$$

$$\frac{-(-6x + 6)}{0}$$

$x^2 - x - 6 = 0$

p, q - Formel:

$p = -1, q = -6$

$$x_{2,3} = \frac{-(-1)}{2} \pm \sqrt{\left(\frac{-1}{2}\right)^2 - (-6)}$$

$x_{2,3} = 0{,}5 \pm \sqrt{6{,}25}$

$x_{2,3} = 0{,}5 \pm 2{,}5$

$x_2 = 3$

$x_3 = -2$ **$N_1(1|0), N_2(3|0), N_3(-2|0)$**

Schnittpunkt mit der y-Achse:

$x = 0$

$f_{(0)} = 0^3 - 2 * 0^2 - 5 * 0 + 6 = 6$

$S_y(0|6)$

Extrempunkte:

$f'_{(x)} = 0$

$3x^2 - 4x - 5 = 0$

A, B, C - Formel:

$A = 3, B = -4, C = -5$

$$x_{1,2} = \frac{-(-4) \pm \sqrt{(-4)^2 - 4*3*(-5)}}{2 * 3} = \frac{4 \pm \sqrt{76}}{6}$$

$$x_{1,2} = \frac{4 \pm 8{,}72}{6}$$

$x_1 = 2{,}12$, $f_{(2,12)} = (2{,}12)^3 - 2 * (2{,}12)^2 - 5 * (2{,}12) + 6 = -4{,}06$

$x_2 = -0{,}79$, $f_{(-0,79)} = (-0{,}79)^3 - 2 * 8\text{-}0{,}79)^2 - 5 * (-0{,}79) + 6 = 8{,}21$

$f''_{(2,12)} = 6 * 2,12 - 4 > 0$ --> **Tiefpunkt (2,12|-4,06)**

$f''_{(-0,79)} = 6 * (-0,79) - 4 < 0$ --> **Hochpunkt (-0,79|8,21)**

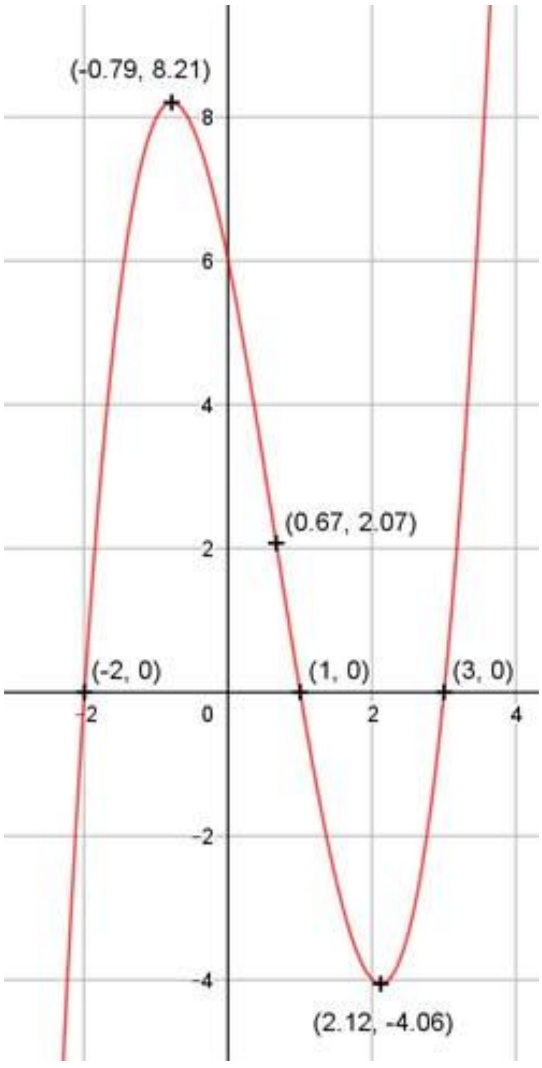
Wendepunkte:

$f''_{(x)} = 0$

$6x - 4 = 0 \mid +4$

$6x = 4 \mid :6$

$x = 2/3$, $f_{(2/3)} = (2/3)^3 - 2 * (2/3)^2 - 5 * (2/3) + 6 = 2,07$, $f'''_{(2/3)} \neq 0$

--> **Wendepunkt (2/3|2,07)**

Graph: