Kurven Aufgabe 28

$f_{(x)} = 0{,}2x^3 + 0{,}6x^2 - 2{,}6x - 3$

$f'_{(x)} = 0{,}6x^2 + 1{,}2x - 2{,}6$, $f''_{(x)} = 1{,}2x + 1{,}2$, $f'''_{(x)} = 1{,}2$

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

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

Asymptoten: -

Symmetrie: -

Nullstellen:

$0{,}2x^3 + 0{,}6x^2 - 2{,}6x - 3 = 0 \mid :0{,}2$

$x^3 + 3x^2 - 13x - 15 = 0$

Durch Probieren gefunden $x = -1$.

Hornerschema:

	1	3	-13	- 15
$x_1 = -1$		- 1	-2	+ 15
	1	2	-15	0

Polynomdivision:

$$
\begin{array}{l}
0{,}2x^3 + 0{,}6x^2 - 2{,}6x - 3 : (x + 1) = 0{,}2x^2 + 0{,}4x - 3 \\
-(0{,}2x^3 + 0{,}2x^2) \\
\hline
\qquad\qquad 0{,}4x^2 - 2{,}6x - 3 \\
\qquad\quad -(0{,}4x^2 + 0{,}4x) \\
\hline
\qquad\qquad\qquad\quad -3x - 3 \\
\qquad\qquad\qquad -(-3x - 3) \\
\hline
\qquad\qquad\qquad\qquad\quad 0
\end{array}
$$

$x^2 + 2x - 15 = 0 \mid (-3)$

p, q - Formel:

$p = 2$, $q = -15$

$$x_{2,3} = \frac{-2}{2} \pm \sqrt{\left(\frac{2}{2}\right)^2 - (-15)}$$

$x_{2,3} = -1 \pm \sqrt{16}$

$x_{2,3} = -1 \pm 4$

$x_2 = 3$

$x_3 = -5$ **$N_1(-1|0)$, $N_2(3|0)$, $N_3(-5|0)$**

Schnittpunkt mit der y-Achse:

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

$S_y(0|-3)$

Extrempunkte:

$0{,}6x^2 + 1{,}2x - 2{,}6 = 0 \; |*(-3)$

A, B, C - Formel:

$A = 0{,}6$, $B = 1{,}2$, $C = -2{,}6$

$$x_{1,2} = \frac{-1{,}2 \pm \sqrt{1{,}2^2-(4*0{,}6*(-2{,}6)}}{2 * 0{,}6} = \frac{-1{,}2 \pm \sqrt{7{,}68}}{1{,}2}$$

$$x_{1,2} = \frac{-1{,}2 \pm 2{,}77}{1{,}2}$$

$x_1 = 1{,}31$, $f_{(1,31)} = 0{,}2 * 1{,}31^3 + 0{,}6 * 1{,}31^2 - 2{,}6 * 1{,}31 - 3 = -4{,}93$

$x_2 = -3{,}31$

$f_{(-3,31)} = 0{,}2 * (-3{,}31)^3 + 0{,}6 * (-3{,}31)^2 - 2{,}6 * (-3{,}31) - 3 = 4{,}93$

$f''_{(1,31)} = 1{,}2 * 1{,}31 + 1{,}2 > 0$ --> **Tiefpunkt $(1{,}31|-4{,}93)$**

$f''_{(-3,31)} = 1{,}2 * (-3{,}31) + 1{,}2 < 0$ --> **Hochpunkt $(-3{,}31|4{,}93)$**

Wendepunkte:

$1{,}2x + 1{,}2 = 0 \; |-1{,}2$

$1{,}2x = -1{,}2 \; | :1{,}2$

$x = -1$, $f_{(-1)} = 0$, $f'''_{(-1)} \neq 0$

--> **Wendepunkt $(-1|0)$**

Graph: