Kurven Aufgabe 44

**$f_{(x)} = x^3 - 9x^2 + 27x - 19$**

$f'_{(x)} = 3x^2 - 18x + 27$, $f''_{(x)} = 6x - 18$, $f'''_{(x)} = 6$

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

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

Asymptoten: -

Symmetrie: -

Nullstellen:

$x^3 - 9x^2 + 27x - 19 = 0$

Hornerschema:

$$
\begin{array}{l|rrrr}
 & 1 & -9 & 27 & -19 \\
x_1 = 1 & & 1 & -8 & 19 \\
\hline
 & 1 & -8 & 19 & 0
\end{array}
$$

Polynomdivision:

$$
\begin{array}{l}
x^3 - 9x^2 + 27x - 19 : (x - 1) = x^2 - 8x + 19 \\
-(x^3 - x^2) \\
\hline
\qquad -8x^2 + 27x - 19 \\
\qquad -(-8x^2 + 8x) \\
\hline
\qquad\qquad 19x - 19 \\
\qquad\qquad -(19x - 19) \\
\hline
\qquad\qquad\qquad 0
\end{array}
$$

$x^2 - 8x + 19 = 0$

p, q - Formel:

$p = -8$, $q = 19$

$$x_{2,3} = \frac{-(-8)}{2} \pm \sqrt{\left(\frac{-8}{2}\right)^2 - 19}$$

$x_{2,3} = -2 \pm \sqrt{-3}$ --> keine weiteren Nullstellen

**$N_1(1|0)$**

Schnittpunkt mit der y-Achse:

$f_{(0)} = 0^3 - 9 * 0^2 + 27 * 0 - 19 = - 19$

**$S_y(0|-19)$**

Extrempunkte:

$3x^2 - 18x + 27 = 0$

A, B, C - Formel:

A = 3, B = - 18, C = 27

$$x_{1,2} = \frac{-(-18) \pm \sqrt{(-18)^2 - 4*3*27}}{2 * 3} = \frac{18 \pm \sqrt{0}}{6}$$

$x_{1,2} = 3$, $f_{(3)} = 3^3 - 9 * 3^2 + 27 * 3 - 19 = 8$

$f''_{(3)} = 6 * 3 - 18 = 0$ --> **kein Extrempunkt**

Wendepunkt:

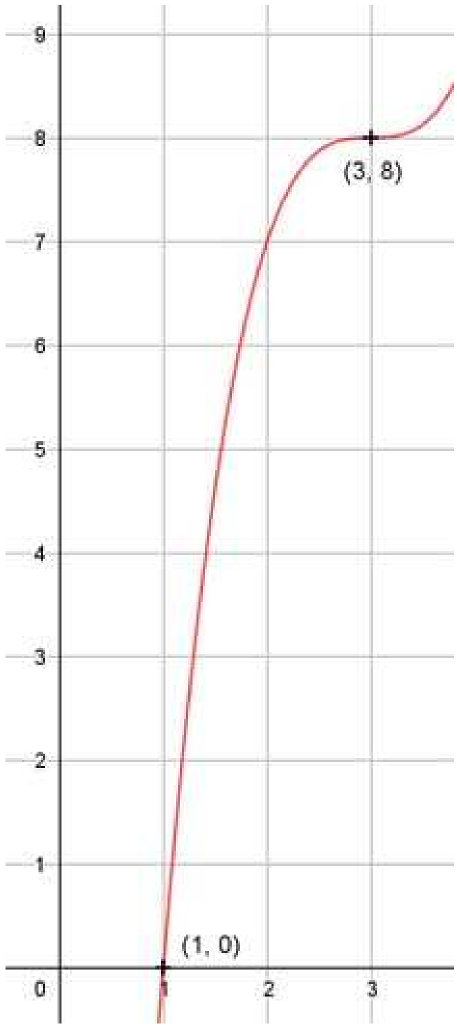
$6x - 18 = 0 \;|+18$

$6x = 18| :6$

$x = 3$, $f_{(3)} = 8$, $f'_{(3)} = f''_{(3)} = 0$, $f'''_{(3)} \neq 0$

--> **Wendepunkt (Sattelpunkt) (3|8)**

Graph:


9
8
7
6
5
4
3
2
1
0
1
2
3
(3, 8)
(1, 0)