

# 14. Schulübung

## Kurvendiskussion

$$f(x) = x^3 + 5x^2 - 12$$

$$x \in [-5; 2]$$

$$f'(x) = 3x^2 + 10x$$

$$f''(x) = 6x + 10$$

1) Nullstellen:

$$x^3 + 5x^2 - 12 = 0 \quad x_1 = -2, \text{ weil } f(-2) = 0$$

$$\frac{(x^3 + 5x^2 - 12) : (x + 2) = x^2 + 3x - 6 \rightarrow \text{Formel}}{-x^3 + 2x^2}$$

$$\begin{array}{r} 3x^2 \\ -3x^2 + 6x \\ \hline -6x - 12 \\ +6x + 12 \\ \hline 0 \text{ R} \end{array}$$

$$x_{1,2} = -\frac{3}{2} \pm \sqrt{\frac{9}{4} + 6} = -\frac{3}{2} \pm \sqrt{\frac{33}{4}} = \frac{-3 \pm \sqrt{33}}{2}$$

$$x_2 = -4,37 \quad x_3 = 1,37$$

2) Extremw.:

$$3x^2 + 10x = 0$$

$$x(3x + 10) = 0$$

$$x_1 = 0$$

$$3x = -10$$

$$x_2 = -\frac{10}{3}$$

$$y_1 = f(0) = -12$$

$$y_2 = f\left(-\frac{10}{3}\right) \approx 6,52$$

Ergebnisse:

$$N_1 = (-4,37 | 0)$$

$$N_2 = (-2 | 0)$$

$$N_3 = (1,37 | 0)$$

$$H = \left(-\frac{10}{3} \mid 6,52\right)$$

$$T = (0 \mid -12)$$

$$W = \left(-\frac{5}{3} \mid -2,74\right)$$

$$k_w \approx -8,33$$

$$A = (-5 \mid -12)$$

$$B = (2 \mid 16)$$

3) Wendep.: :

$$6x + 10 = 0$$

$$6x = -10$$

$$x = -\frac{5}{3}$$

$$y = f\left(-\frac{5}{3}\right) \approx -2,74$$

4) Steigung im Punkt W:

In 1. Ableitung  $x$  von W einsetzen!

$$k_w = f'\left(-\frac{5}{3}\right) \approx -8,33$$

5) Randpunkte:

$$f(-5) = -12$$

$$f(2) = 16$$

