

## Aufgaben Extrempunkte 1

1.)  $f'(x) = x^4 - 10x^2 + 9$      $x^2 = z$      $0 = z^2 - 10z + 9$   
 $z_{1/2} = 5 \pm \sqrt{16}$

$z_1 = 9 \longrightarrow \underline{x_1 = 3} \quad \underline{x_2 = -3}$

$z_2 = 1 \longrightarrow \underline{x_3 = 1} \quad \underline{x_4 = -1}$

2.)  $0 = x \left( \frac{2}{3}x^2 - x + \frac{3}{8} \right)$      $\underline{x_1 = 0}$   
 $0 = x^2 - \frac{3}{2}x + \frac{9}{16}$      $x_{2/3} = \frac{3}{4} \pm \sqrt{\frac{9}{16} - \frac{9}{16}}$      $\underline{x_2 = \frac{3}{4}}$

$f'(x) = 2x^2 - 2x + \frac{3}{8}$      $0 = x^2 - x + \frac{3}{16}$      $x_1 = \frac{1}{4}$      $x_2 = \frac{3}{4}$

$f''(x) = 4x - 2$

$y_1 = 0,042$      $y_2 =$

$f''\left(\frac{1}{4}\right) = -1$

Max  $\left(\frac{1}{4} / 0,042\right)$

$f''\left(\frac{3}{4}\right) = 1$

Min  $\left(\frac{3}{4} / 0\right)$

3.) NST:  $\underline{x_{N1} = 0}$      $\underline{x_{N2} = 8}$      $f(x) = x(x^2 - 16x + 64)$

$f(x) = x^3 - 16x^2 + 64x$

$f'(x) = 3x^2 - 32x + 64$

$0 = x^2 - \frac{32}{3}x + \frac{64}{3}$

$\underline{x_1 = \frac{8}{3}}$

$\underline{x_2 = 8}$

$f''(x) = 6x - 32$

$f''\left(\frac{8}{3}\right) = -16 \Rightarrow \text{Max}$

$f''(8) = 16 \Rightarrow \text{Min}$

4.) DB:  $x \in \mathbb{R}, x \neq 0$

$f(-x) = \frac{(-x)^2}{9} + \frac{9}{(-x)^2} = \frac{x^2}{9} + \frac{9}{x^2}$      $f(-x) = f(x) \Rightarrow \text{achsensymm.}$

$f'(x) = \frac{2}{9}x - \frac{18}{x^3}$

$0 = \frac{2}{9}x - \frac{18}{x^3} \quad | \cdot x^3$

$0 = \frac{2}{9}x^4 - 18 \quad x^4 = 81$

$\underline{x_{E1} = 3} \quad \underline{y_{E1} = 2}$

$\underline{x_{E2} = -3} \quad \underline{y_{E2} = 2}$

$f''(x) = \frac{2}{9} + \frac{54}{x^4}$

$f''(3) = \frac{5}{9} \Rightarrow \underline{\underline{\text{Min}}}$

$f''(-3) = \frac{5}{9} \Rightarrow \underline{\underline{\text{Min}}}$

Min<sub>1</sub> (3/2)

Min<sub>2</sub> (-3/2)