Langeda David 2020.HÜ 28.11.24

5.25 / ba) $f(t) = \frac{1}{30}t^5 - \frac{1}{2}t^3$

$f'(t) = \frac{5}{30}t^4 - \frac{3}{2}t^2 = \frac{1}{6}t^4 - \frac{3}{2}t^2$

$f''(t) = \frac{20}{30}t^3 - \frac{6}{2}t = \frac{2}{3}t^3 - 3t$

$f'''(t) = \frac{60}{30}t^2 - \frac{6}{2} = 2t^2 - 3$

1) $\mathbb{D} = \mathbb{R}$ Stetig keine Polstellen / Lücken

2) $\lim_{t \to \infty} \frac{1}{30}t^5 - \frac{1}{2}t^3 = \infty$

$\lim_{t \to -\infty} \frac{1}{30}t^5 - \frac{1}{2}t^3 = -\infty$

3) Nullstellen

$0 = \frac{1}{30}t^5 - \frac{1}{2}t^3 = \frac{t^5}{30} - \frac{t^3}{2}$

$\frac{t^3}{2} = \frac{t^5}{30}$ $15t^3 = t^5$ $0 = t^3(t^2 - 15) = t^3(t - \sqrt{15})(t + \sqrt{15})$

$N_1(0|0)$ $N_2(\sqrt{15}|0)$ $N_3(-\sqrt{15}|0)$

4) Extremstellen

$0 = \frac{t^4}{6} - \frac{3t^2}{2}$

$0 = t^4 - 9t^2$

$0 = t^2(t^2 - 9)(t^2 + 3)$

$t_1 = 0$ $t_2 = 3$ $t_3 = -3$

$f''(0) = 0 \Rightarrow$ keine Aussage

$f''(3) = 9$ $9 > 0 \Rightarrow T(3|-\frac{27}{5})$

$f''(-3) = -9$ $-9 < 0 \rightarrow H(-3|\frac{27}{5})$

S. 25 a) $f(t) = -t^3 + t^2$

$f'(t) = -3t^2 + 2t$

$f''(t) = -6t + 2$

$f'''(t) = -6$

Verhalten im Unendlichen

2) $\lim_{t \to \infty} -t^3 + t^2 = -\infty$

$\lim_{t \to -\infty} -t^3 + t^2 = -\infty$

3) Nullstellen

$0 = -t^3 + t^2$

$0 = t^2 \cdot (-t + 1)$

$t_1 = 0 \quad t_2 = 1$

$N_1(0|0)$

$N_2(1|0)$

4) Extremstellen

$0 = -3t^2 + 2t$

$0 = t(-3t + 2)$

$t_1 = 0 \quad t_2 = \frac{2}{3}$

1) $\mathbb{D} = \mathbb{R}$ stetig keine Polstellen / Lücken

$f''(0) =$ [illegible]

$f''(\frac{2}{3}) =$

$f''(0) = 2 \quad 2 > 0 \Rightarrow T(0|0)$

$f''(\frac{2}{3}) = -2 \quad -2 < 0 \Rightarrow H(\frac{2}{3} | \frac{4}{27})$