Parameter Variable

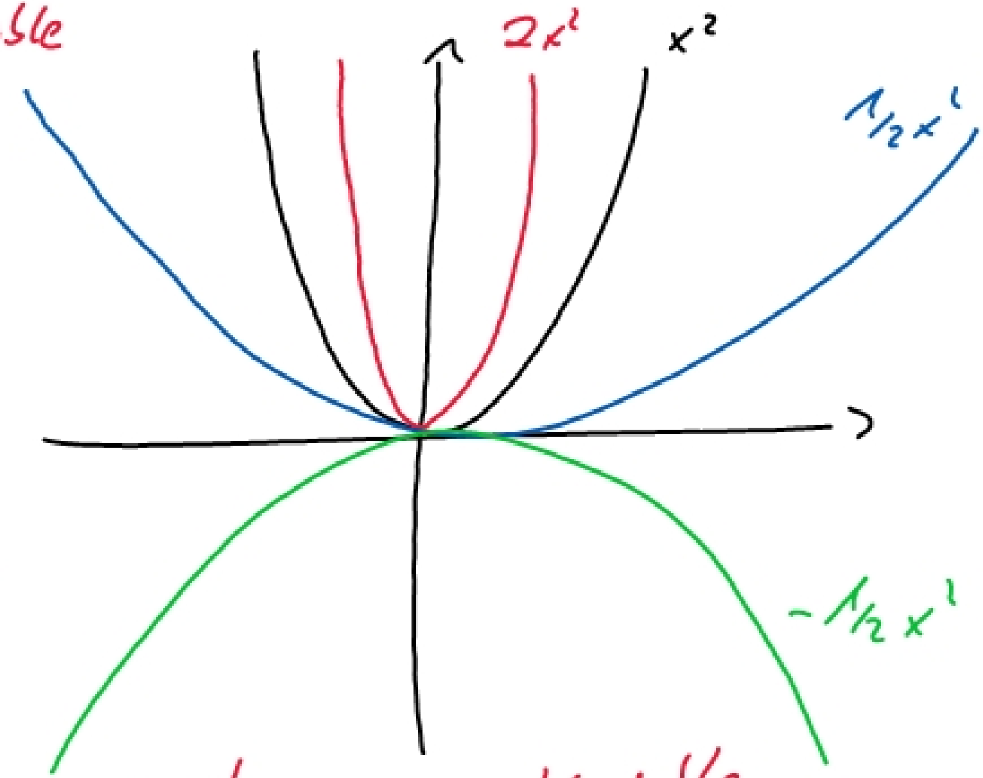
$f_a(x) = a \cdot x^2$

$|a| > 1$: steiler

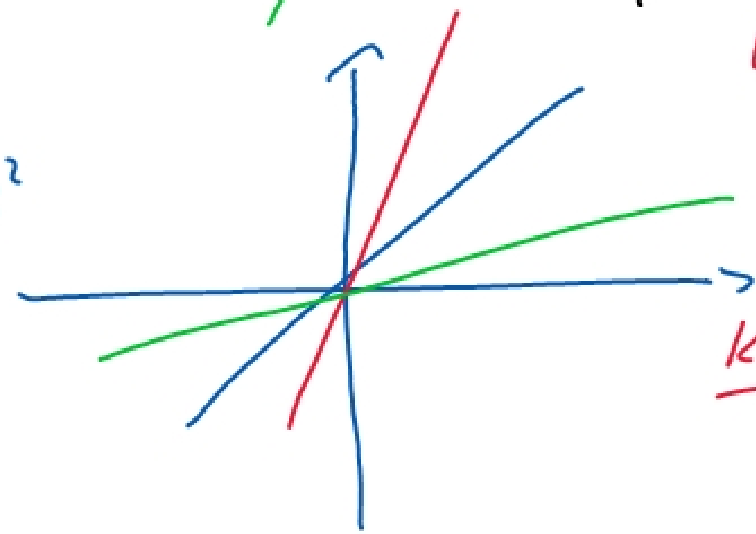
$|a| < 1$: gestaucht

$a < 0$: nach unten

$a > 0$: nach oben



$f_x(a) = a \cdot x^2$



Variable

$42 \cdot \alpha \cdot x^3$

Koeffizient

Parameter

5) c), e), i), l)

5) $(ax+3y)^2 = a^2x^2 + 6axy + 9y^2$

c) $(2x - \frac{1}{2}xy)(2x + \frac{1}{2}xy) = 4x^2 - \frac{1}{4}x^2y^2$

e) $(\frac{1}{4}x + 2xy)^2 = \frac{1}{16}x^2 + x^2y + 4x^2y^2$

i) $(\frac{1}{4}i - 0{,}2x)(\frac{1}{4}i + 0{,}2x) = -\frac{1}{16} - 0{,}04x^2$

l) $3\cdot(2y + \frac{1}{3}x)(\frac{1}{3}x - 2y) - 4\cdot(\frac{2x}{y} + 3y)^2$

$3\cdot(4y^2 - \frac{1}{9}x^2) - 4\cdot(\frac{4x^2}{y^2} + 12x + 9y^2)$

$\underline{12y^2} - \frac{1}{3}x^2 - \frac{16x^2}{y^2} - 48x \underline{-36y^2}$ $\rightarrow -24y^2$

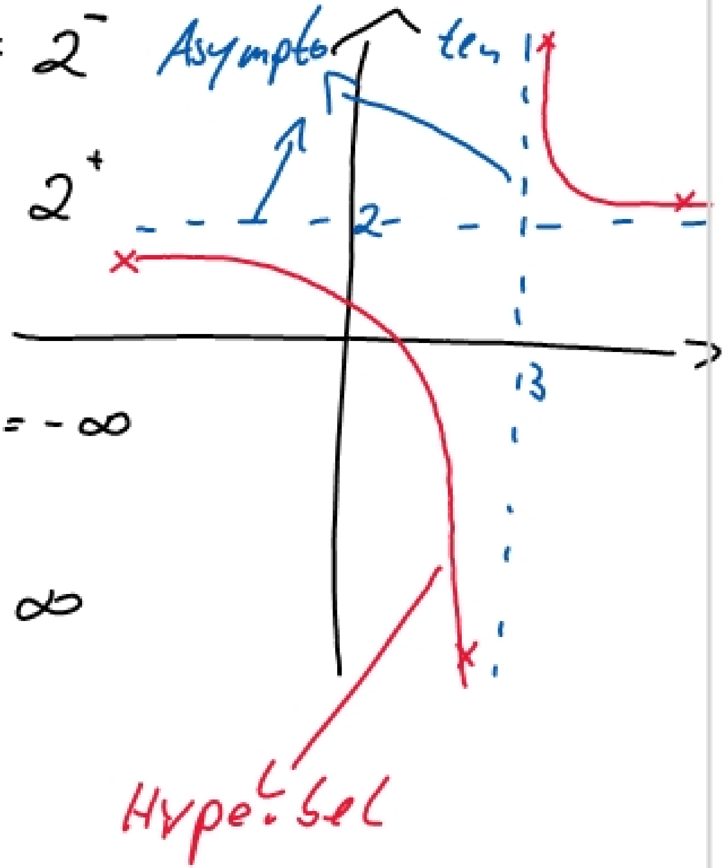
Grenzwert 1

$$f(x) = 2 + \frac{1}{x-3} \quad ; \quad \mathbb{D} = \mathbb{R} \setminus \{3\}$$

$$\frac{K}{0} = \infty \wedge \frac{K}{\infty} = 0$$

$$\lim_{x \to -\infty} f(x) = \left[2 + \frac{1}{-\infty}\right] = \left[2 + 0^-\right] = 2^-$$

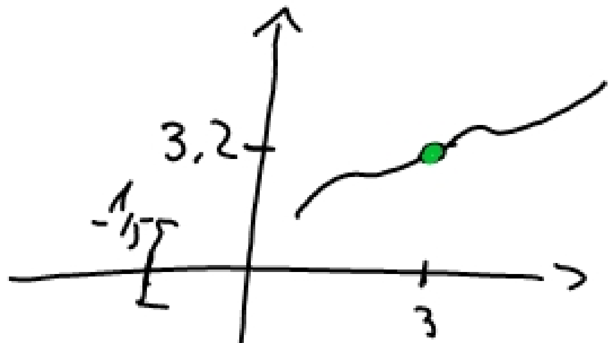
$$\lim_{x \to \infty} f(x) = \left[2 + \frac{1}{\infty}\right] = \left[2 + 0^+\right] = 2^+$$



$$\lim_{x \to 3^-} f(x) = \left[2 + \frac{1}{0^-}\right] = \left[2 + -\infty\right] = -\infty$$

$$\lim_{x \to 3^+} f(x) = \left[2 + \frac{1}{0^+}\right] = \left[2 + \infty\right] = \infty$$

$$f(x) = \frac{4x - 12}{2\cdot\underbrace{\sqrt{5x+1}}_{=0\;:\;x=-1/5} - 8} \qquad D = \mathbb{R}^{\geq -1/5} \setminus \{3\}$$



$$\lim_{x \to 3} f(x) = 0/0 \qquad (x-3)$$

NR.

$$\frac{4\,(x-3)}{\underset{a}{2\cdot\sqrt{5x+1}} \underset{-}{-} \underset{b}{8}} \cdot \frac{2\sqrt{5x+1} + 8}{\underset{a}{2\sqrt{5x+1}} \underset{+}{+} \underset{b}{8}}$$

$$\frac{\cancel{4}\cdot\cancel{(x-3)}\,(2\sqrt{5x+1} + 8)}{\underset{a^2}{4\cdot(5x+1)} \underset{-}{-} \underset{b^2}{64}} \qquad = 20x - 60 = \underset{5}{\cancel{20}\cdot\cancel{(x-3)}}$$

$$f(x) = \begin{cases} \text{s.o.}, & x \geq -1/5 \;\wedge\; x \neq 3 \\ 3{,}2, & x = 3 \end{cases}$$

$$\lim_{x \to 3} \frac{2\sqrt{5x+1} + 8}{5} = \frac{16}{5} = 3\tfrac{1}{5} = 3{,}2$$

$$f(x) = \frac{10 + 5x}{3 \cdot \underbrace{\sqrt{10-3x}}_{=0\,:\; x = 10/3} - 12} \quad ; \quad \mathbb{D} = \mathbb{R}^{\leq 10/3} \setminus \{-2\}$$

$$\lim_{x \to -2} f(x) = \frac{0}{0} \longrightarrow (x+2)$$

NR:

$$\frac{5 \cdot (x+2)}{3 \cdot \sqrt{10-3x} - 12} \cdot \frac{3\sqrt{10-3x} + 12}{3\sqrt{10-3x} + 12}$$

$$\frac{5 \cdot (x+2) \cdot (3\sqrt{10-3x} + 12)}{9 \cdot (10-3x) - 144} \qquad 9 \cdot (10-3x) - 144 = 90 - 27x - 144 = -27(x+2)$$

$$\lim_{x \to -2} \frac{5 \cdot (3\sqrt{10-3x} + 12)}{-27} = \frac{40}{-9} = -4\tfrac{4}{9} = -4,\overline{4}$$

Pascal'sche Dreieck

$(a+b)^n$

→ Koeffizienten Struktur

$$\left(2x - \tfrac{1}{2}\right)^4 = \left(2x - \tfrac{1}{2}\right)^2 \left(2x - \tfrac{1}{2}\right)^2$$

	n
1	0
1 1	1
1 2 1	2
1 3 3 1	3
⇒ 1 4 6 4 1	4
1 5 10 10 5 1	5

$$1(2x)^4\left(-\tfrac{1}{2}\right)^0 + 4(2x)^3\left(-\tfrac{1}{2}\right)^1 + 6(2x)^2\left(-\tfrac{1}{2}\right)^2 + 4(2x)^1\left(-\tfrac{1}{2}\right)^3 + 1(2x)^0\left(-\tfrac{1}{2}\right)^4$$

$$16x^4 - 16x^3 + 6x^2 - x + \tfrac{1}{16}$$

$(2-i)^5$

$1\, 2^5 + 5\, 2^4 (-i)^1 + 10\, 2^3 (-i)^2 + 10\, 2^2 (-i)^3 + 5\, 2^1 (-i)^4 + 1 (-i)^5$

$32 \quad - 80i \quad - 80 \quad + 40i \quad + 10 \quad - i$

$-38 - 41i$

$\alpha = \arctan \frac{41}{38} + \pi$