Parameter ← → Variable

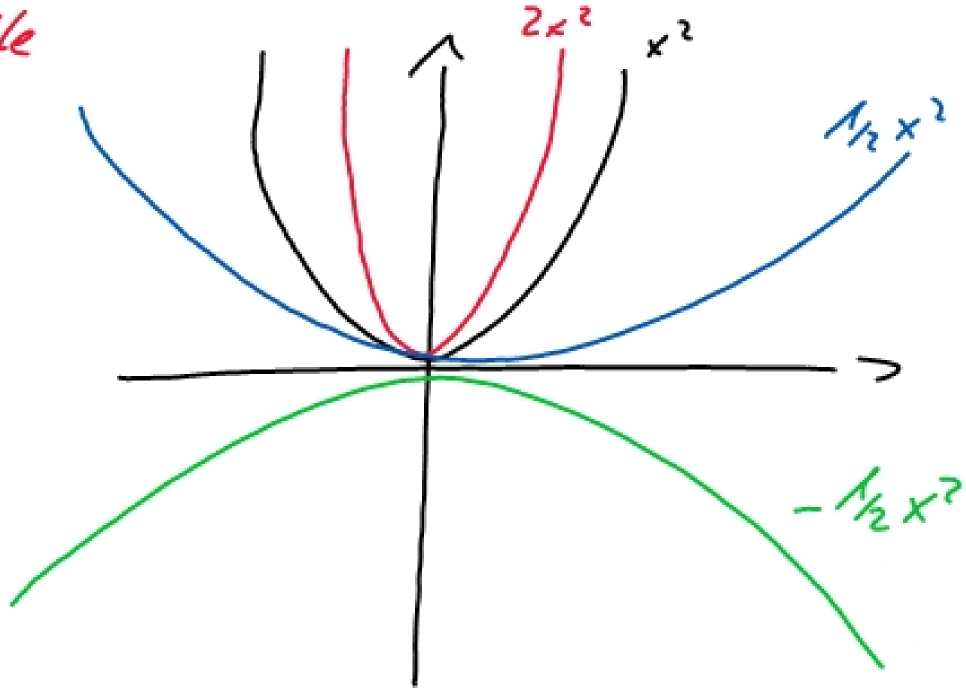
$f_a(x) = a \cdot x^2$

$|a| > 1$: gestreckt

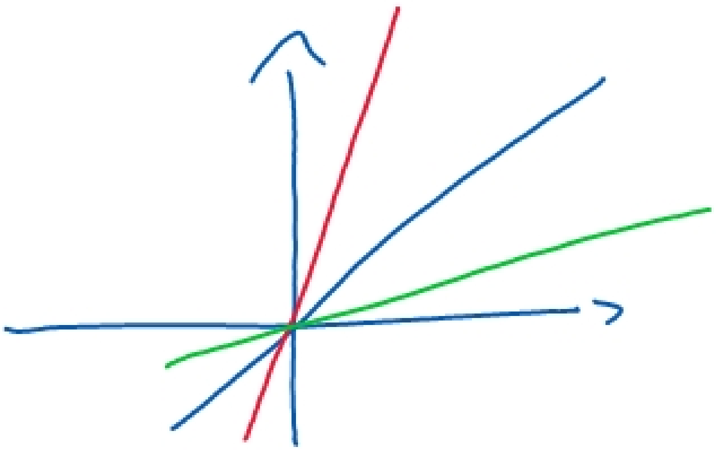
$|a| < 1$: gestaucht

$a < 0$: unten offen

$a > 0$: oben offen



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



→ Koeffizient

$42 \cdot \alpha \cdot x^2$

→ Variable

Parameter

c) d) e) i) 2)

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

d) $(2cd - \frac{3d}{c})^2 = 4c^2d^2 - 12d^2 + \frac{9d^2}{c^2}$

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

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

2) $(3b - ab)(3b + ab) - (a - 2b)^2$

$9b^2 - a^2b^2 - (a^2 - 4ab + 4b^2)$

$-a^2 + 4ab - a^2b^2 + 5b^2$

Grenzwerte

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

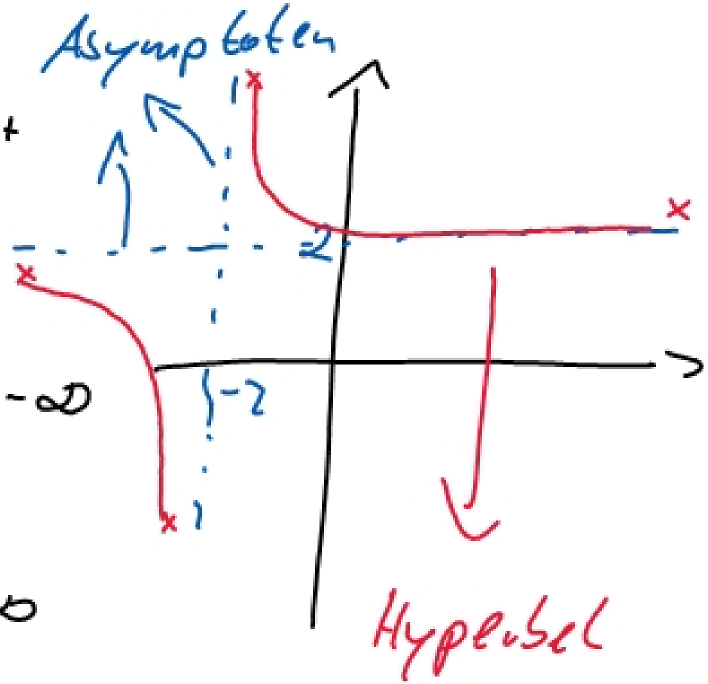
$$\frac{K}{0} = \infty \; ; \; \frac{K}{\infty} = 0$$

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

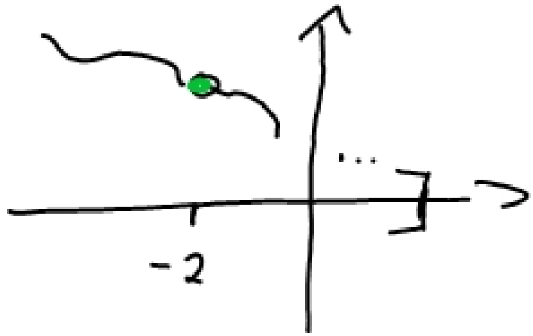
$$\lim_{x \to \infty} f(x) = \left[2 + \frac{1}{\infty}\right] = \left[2 + 0^+\right] = 2^+$$

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

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



$$f(x) = \frac{4x+8}{2\cdot\sqrt{\underbrace{3-3x}_{=0\ :\ x=1}} - 6} \qquad D = \mathbb{R}^{\leq 1} \setminus \{-2\}$$



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

NR:

$$\frac{4\cdot(x+2)}{2\sqrt{3-3x}-6} \cdot \frac{2\sqrt{3-3x}+6}{2\sqrt{3-3x}+6}$$

$$\frac{\cancel{4\cdot(x+2)}\cdot(2\sqrt{3-3x}+6)}{4\cdot(3-3x)-36} \qquad = 12-12x-36 = \underbrace{-12(x+2)}_{-3}$$

$$f(x) = \begin{cases} \text{s.o.}; & x \leq 1 \land x \neq 2 \\ -4; & x = -2 \end{cases}$$

$$\lim_{x \to -2} \frac{2\cdot\sqrt{3-3x}+6}{-3} = \frac{12}{-3} = -4$$

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

$$\lim_{x\to -4} f(x) = \frac{0}{0} \longrightarrow (x+4)$$

$$\underline{\text{NR}}: \quad \frac{2\cdot(x+4)}{3\sqrt{8-2x}-12} \qquad \frac{3\cdot\sqrt{8-2x}+12}{3\cdot\sqrt{8-2x}+12}$$

$$\frac{\cancel{2}\cdot(x+4)\cdot(3\cdot\sqrt{8-2x}+12)}{9\cdot(8-2x)-144} \quad 9\cdot(8-2x)-144 = 72-18x-144 = \underset{-9}{-18}\cdot\underline{(x+4)}$$

$$\lim_{x\to -4} \frac{3\cdot\sqrt{8-2x}+12}{-9} = -\frac{24}{9} = -\frac{8}{3}$$

Pascal'sche Dreieck

$(a+b)^4$ ⇒ Koeffizienten - Struktur

$$\left(\underline{\underline{2x}} - \underline{\underline{1/2}}\right)^{4} = \left(2x - 1/2\right)^2 \cdot \left(2x - 1/2\right)^2$$

	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

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

$$16x^4 \quad - \quad 16x^3 \quad + \quad 6x^2 \quad - \quad x \quad + \quad 1/16$$

$$\left(\tfrac{1}{2} - 2i\right)^5$$

$$1\left(\tfrac{1}{2}\right)^5 + 5\left(\tfrac{1}{2}\right)^4(-2i)^1 + 10\left(\tfrac{1}{2}\right)^3(-2i)^2 + 10\left(\tfrac{1}{2}\right)^2(-2i)^3 + 5\left(\tfrac{1}{2}\right)^1(-2i)^4 + 1(-2i)^5$$

$$\tfrac{1}{32} - \tfrac{5}{8}i - 5 + 20i + 40 - 32i$$

$$35\tfrac{1}{32} - 12\tfrac{5}{8}i$$

$$\alpha = \dots + 2\pi$$