S. 94 Nr. 1:

$$\lim_{x \to (-4)} \frac{2(x+4)}{\underbrace{\sqrt{8-2x}}_{a} \underbrace{-}_{-} \underbrace{(8+x)}_{b}} \cdot \frac{\sqrt{8-2x} + (8+x)}{\underbrace{\sqrt{8-2x}}_{a} \underbrace{+}_{+} \underbrace{(8+x)}_{b}}$$

$$\lim_{x \to (-4)} \frac{2(x+4)\left(\sqrt{8-2x} + (8+x)\right)}{\underbrace{(8-2x)}_{a^2} \underbrace{-}_{-} \underbrace{(8+x)^2}_{b^2}} \longrightarrow 8-2x-(64+16x+x^2)$$

$$-x^2-18x-56$$

$$\frac{-(x^2+18x+56)}{-(x+4)(x+14)}$$

$$\lim_{x \to (-4)} \frac{2(\cancel{x+4})\left(\sqrt{8-2x} + (8+x)\right)}{-(\cancel{x+4})(x+14)}$$

$$\left[\frac{2 \cdot (\sqrt{16} + 4)}{-(10)}\right] = -\frac{16}{10} = -1{,}6$$

2) $\lim\limits_{x \to 4} \dfrac{x^3 - 2x^2 - 12x + 16}{x^2 + x - 20} = \left[\dfrac{0}{0}\right]$

I

$\lim\limits_{x \to 4} \dfrac{(\cancel{x-4})(x^2+2x-4)}{(\cancel{x-4})(x+5)} = \dfrac{20}{9}$

$\boxed{\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1}$

II $\lim\limits_{x \to 4} \dfrac{3x^2 - 4x - 12}{2x + 1} = \dfrac{20}{9}$

$[-2;2]^2 = [-2;0]^2 \cup \,]0;2]^2 \to [0;4]$

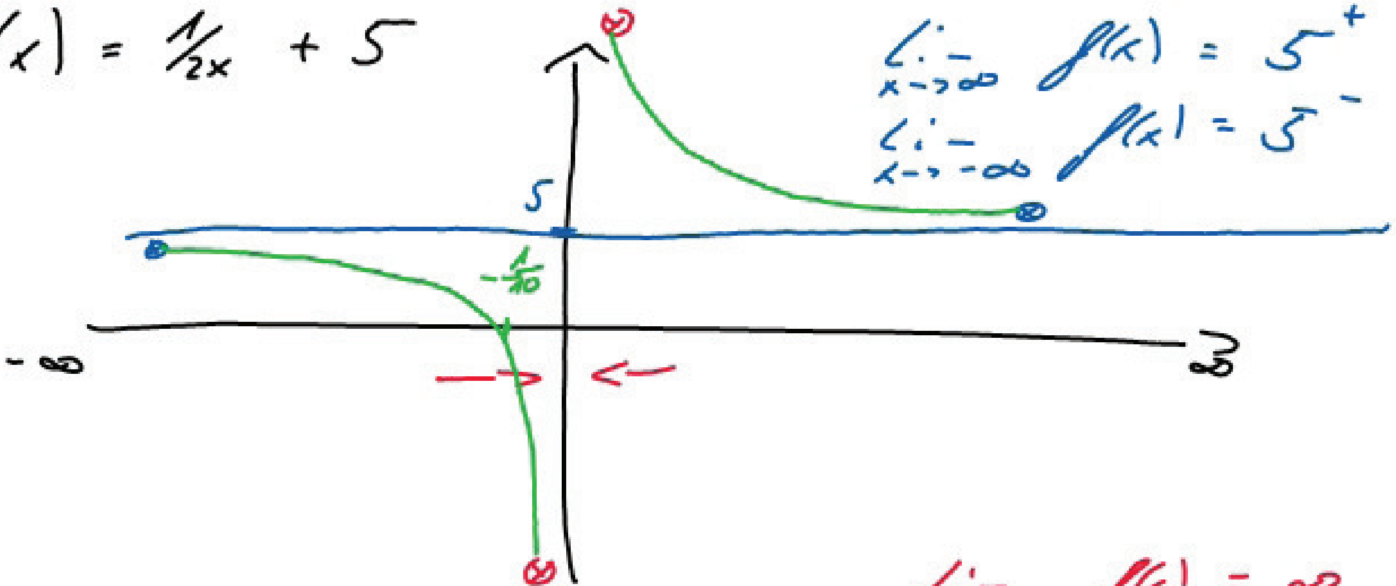
3) $\lim\limits_{x \to \infty} \left(1 + \dfrac{5}{x}\right)^x - \dfrac{3}{\sqrt[x]{9}} + \left(\dfrac{2}{4} \cdot \dfrac{\sin x}{x}\right)^2$

$\boxed{e^5 \quad - 3} + \underbrace{\left(\dfrac{2 \cdot [-1;1]}{4 \cdot \infty}\right)^2}_{\frac{[-2;2]^2}{16\infty^2}} \to \dfrac{[0;4]}{\infty} = 0$

Asymptoten

Graphische Interpretation eines Grenzwertes.

$f(x) = \frac{1}{2x} + 5$



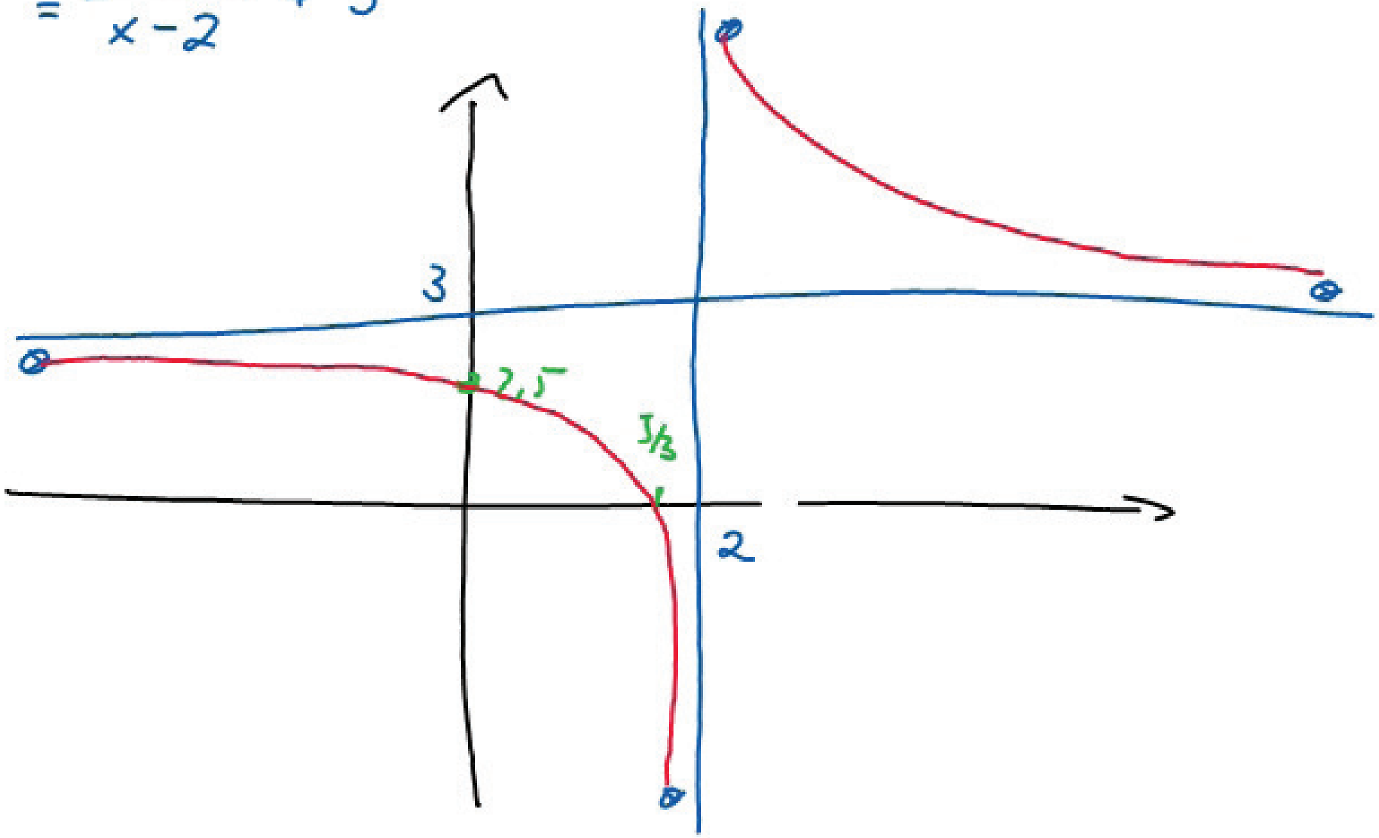
$\lim_{x \to \infty} f(x) = 5^{+}$

$\lim_{x \to -\infty} f(x) = 5^{-}$

$\lim_{x \to 0^{+}} f(x) = \infty$

$\lim_{x \to 0^{-}} f(x) = -\infty$

$$g(x) = \frac{1}{x-2} + 3$$



S. 100 Nr. 1)

$$f(x) = \frac{x^3 - 2x^2 - 4x + 8}{2(x^3 - x^2 - 8x + 12)} = \frac{(x-2)(x+2)(x-2)}{2(x-2)(x-2)(x+3)}$$

$(x^3 - x^2 - 8x + 12) : (x-2) = x^2 + x - 6x$ $\qquad \mathbb{D} = \mathbb{R} \setminus \{-3; 2\}$

$-(x^3 - 2x^2)$

$\quad x^2 - 8x + 12$

$\quad -(x^2 - 2x)$

$\quad\quad -6x + 12$

$\quad\quad -(-6x + 12)$

$\quad\quad\quad -\ -$

$(x+3)(x-2)$

$(x^3 - 2x^2 - 4x + 8) : (x-2) = \underbrace{x^2 - 4}$

$-(x^3 - 2x^2)$

$\quad -\ -\ -4x + 8$

$\quad -(-4x + 8)$

$\quad\quad -\ -$

$(x+2)(x-2)$

$$f_e(x) = \frac{x+2}{2x+6} \quad ; \quad \mathbb{D} = \mathbb{R} \setminus \{-3\}$$

$$f_e(x) = \frac{x+2}{2x+6}$$

$$\lim_{x \to 2^+} f(x) = \lim_{x \to 2^-} f(x) = f_e(2) = 2/5$$ → behebbare Lücke

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

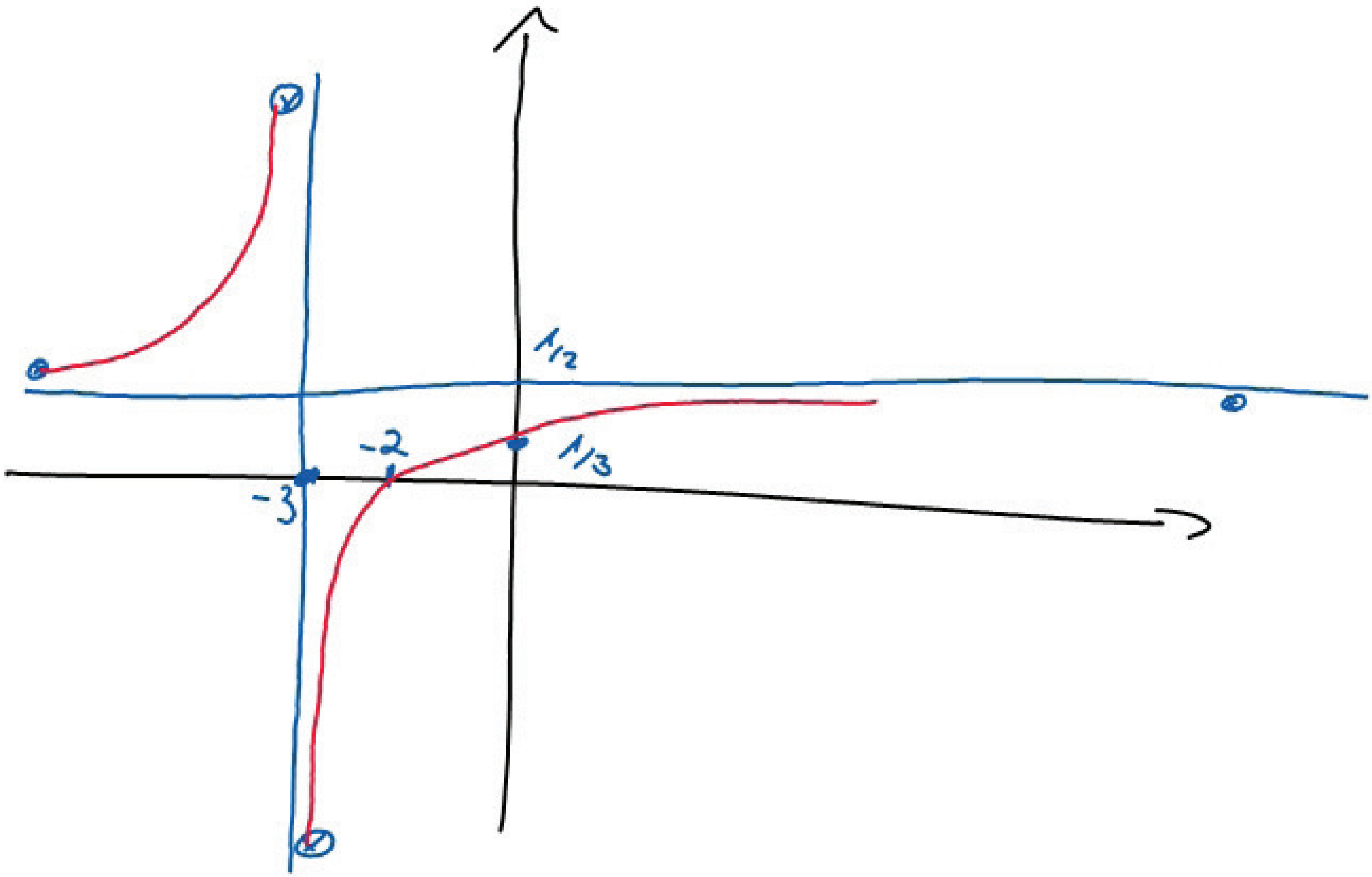
$$\lim_{x \to \infty} f(x) = \lim_{x \to \infty} \frac{\cancel{x}(1 + \overbrace{2/x}^{\to 0})}{\cancel{x} \cdot (2 + \underbrace{6/x}_{\to 0})} = 1/2$$

$$\lim_{x \to -\infty} f(x) = 1/2$$

<u>Achsenschnittpunkte:</u>

$f(0) = 1/3$

$f(x) = 0 \;\to\; x = -2$



1/2
-2
1/3
-3