S. 104 Nr. 1)

$$f(x) = \frac{3 \cdot (x^3 - 5x^2 - x + 5)}{-2\,(x^3 - 6x^2 + 3x + 10)} \qquad \mathbb{D} = \mathbb{R} \setminus \{\underline{-1; 2; 5}\}$$

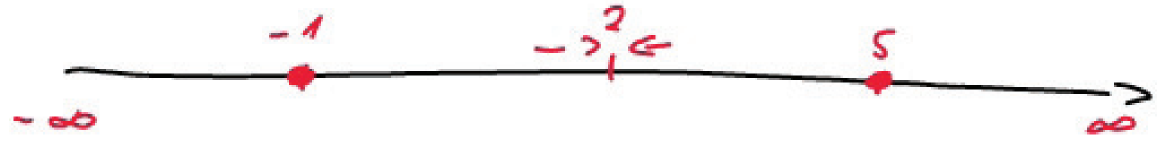
$$(x^3 - 6x^2 + 3x + 10) : (x + 1) = \underbrace{x^2 - 7x + 10}_{(x-5)(x-2)}$$

$$\begin{array}{l}
-(x^3 + x^2) \\
\hline
/ \quad -7x^2 + 3x + 10 \\
\quad -(-7x^2 - 7x) \\
\hline
\quad / \quad 10x + 10 \\
\quad\quad -(10x + 10) \\
\hline
\quad\quad / \quad\quad /
\end{array}$$

$$(x^3 - 5x^2 - x + 5) : (x + 1) = \underbrace{x^2 - 6x + 5}_{(x-1)(x-5)}$$

$$\begin{array}{l}
-(x^3 + x^2) \\
\hline
\quad -6x^2 - x + 5 \\
\quad -(-6x^2 - 6x) \\
\hline
\quad\quad 5x + 5 \\
\quad\quad -(5x + 5) \\
\hline
\quad\quad / \quad /
\end{array}$$

$$f(x) = \frac{3\,\cancel{(x+1)}\,(x-1)\,\cancel{(x-5)}}{-2\,\cancel{(x+1)}\,(x-2)\,\cancel{(x-5)}} = \frac{3\,(x-1)}{-2\,(x-2)} \quad ; \ \mathbb{D} = \mathbb{R}\setminus\{2\}$$



I. $\lim\limits_{x\to -1} f(x) = f_e(-1) = \frac{-6}{6} = -1$

$\lim\limits_{x\to 5} f(x) = f_e(5) = \frac{12}{-6} = -2$ } behebbare Lücken

II. $\lim\limits_{x\to 2^+} f(x) = \left[\frac{3}{0^-}\right] = -\infty$

$\lim\limits_{x\to 2^-} f(x) = \left[\frac{3}{0^+}\right] = \infty$ } senkrechte Asym.

III. $\lim\limits_{x\to \infty} f(x) = \lim\limits_{x\to\infty} \frac{x\,(3 - 3/x)}{x\,(-2 + 4/x)} = -\frac{3}{2} = \lim\limits_{x\to -\infty} f(x)$

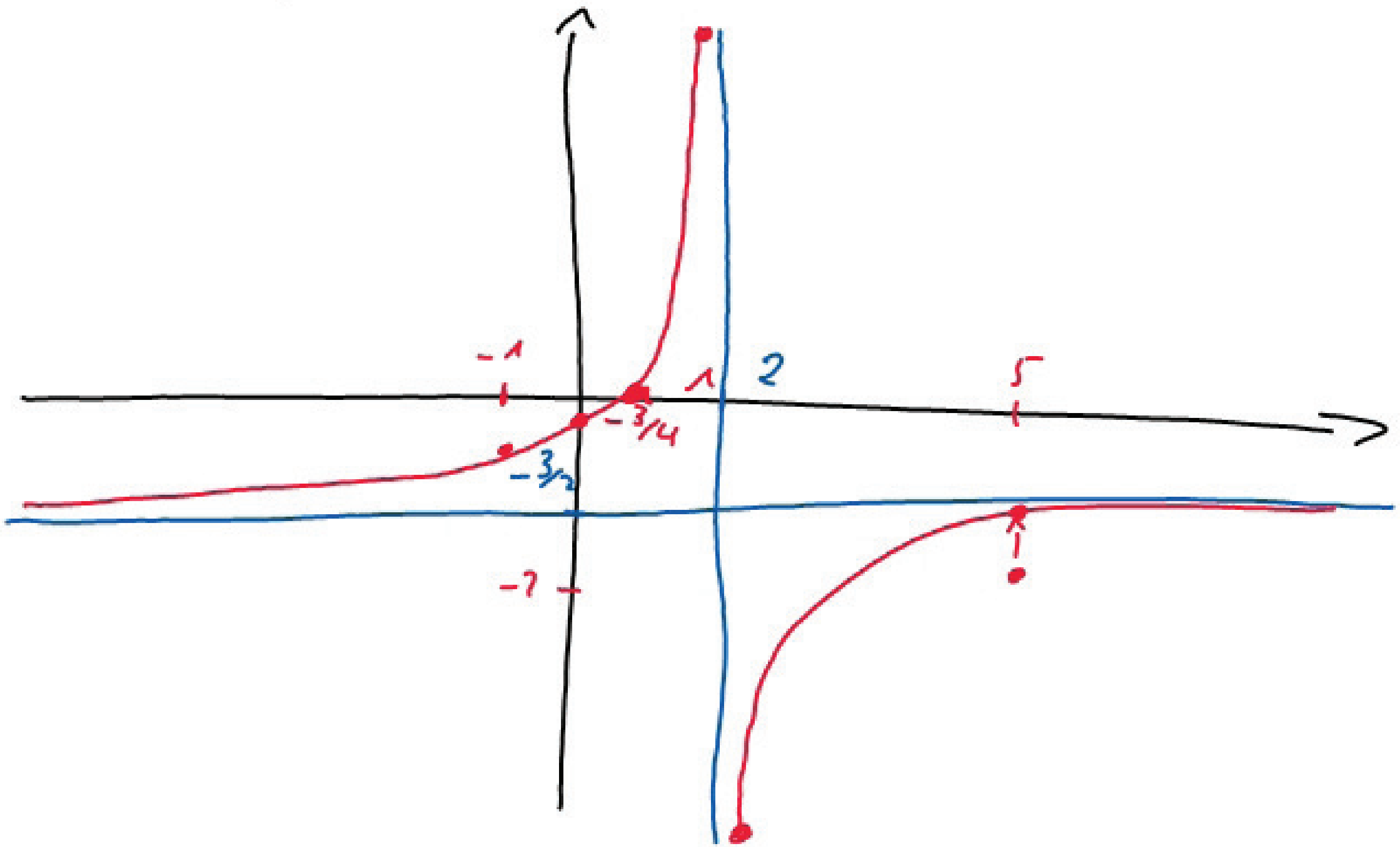
$$f_c(x) = \frac{3(x-1)}{-2(x-2)} \quad , \quad \mathbb{D} = \mathbb{R} \setminus \{2\}$$

y - Achse: $x = 0$

$$f(0) = \frac{-3}{4} = -3/4$$

x - Achse: $f(x) = 0$

$$x = 1$$



S 109 Nr. 1)

I. $\lim\limits_{x \to 2^+} f(x) = 2 - 4 = f(2) = -2$

$\lim\limits_{x \to 2^-} f(x) = -4a + 1$

$\Rightarrow -2 = -4a + 1$

$a = 3/4$

$\Rightarrow$ stetig

II. $f'(x) = \begin{cases} -2ax & ; x < 2 \\ 1 & ; x \geq 2 \end{cases}$

$\lim\limits_{x \to 2^+} f'(x) = 1$

$\lim\limits_{x \to 2^-} f'(x) = -4a$

$\Rightarrow 1 = -4a$

$a = -1/4$

$1 = -3$ ↯ $\Rightarrow$ nicht differenzierbar

S 109 Nr. 2

$$f(x) = \begin{cases} ax + b \,; & x < 1 \\ x - ax^2 \,; & x \geq 1 \end{cases} \quad \Rightarrow \quad f'(x) = \begin{cases} a \,; & x < 1 \\ 1 - 2ax \,; & x \geq 1 \end{cases}$$

$$\left.\begin{array}{l} \lim\limits_{x \to 1^-} f(x) = a + b \\ \lim\limits_{x \to 1^+} f(x) = 1 - a \end{array}\right\} = \qquad \left.\begin{array}{l} \lim\limits_{x \to 1^-} f'(x) = a \\ \lim\limits_{x \to 1^+} f'(x) = 1 - 2a \end{array}\right\} =$$

$$a + b = 1 - a \qquad\qquad a = 1 - 2a$$

$$b = 1 - 2a \qquad\qquad a = 1/3$$

$$b = 1/3$$