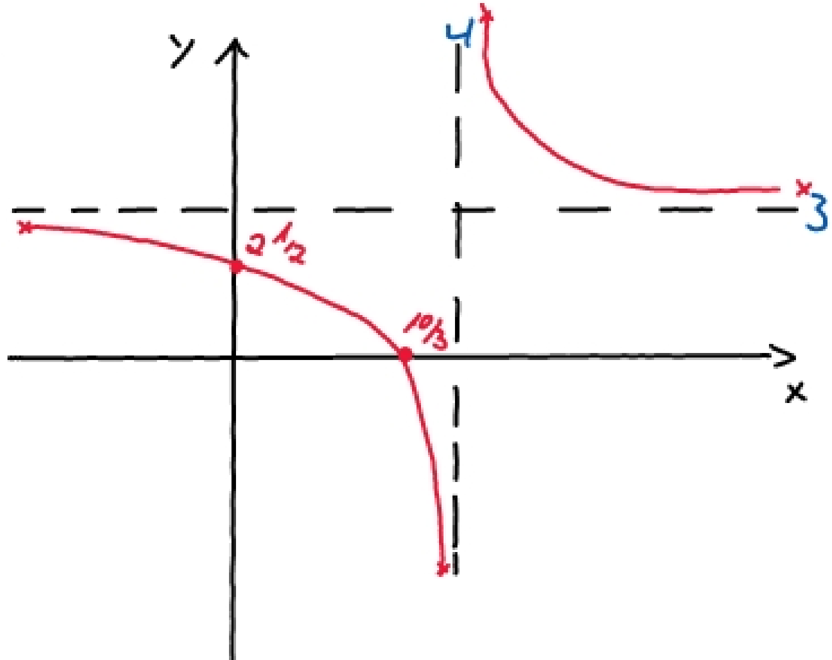
S1/7

1) $f(x) = 3 + \frac{2}{x-4}$; $x-4=0$ $\Rightarrow$ $\mathbb{D} = x \in \mathbb{R} \setminus \{4\}$

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

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



$\lim_{x \to 4^-} f(x) = \left[3 + \frac{2}{0^-}\right] = -\infty$

$\lim_{x \to 4^+} f(x) = \left[3 + \frac{2}{0^+}\right] = +\infty$

$\mathbb{W} = y \in \mathbb{R} \setminus \{3\}$

$f(0) = 3 + \frac{2}{0-4} = \underline{\underline{2\tfrac{1}{2}}}$ $\rightarrow$ y-Achse

x-Achse

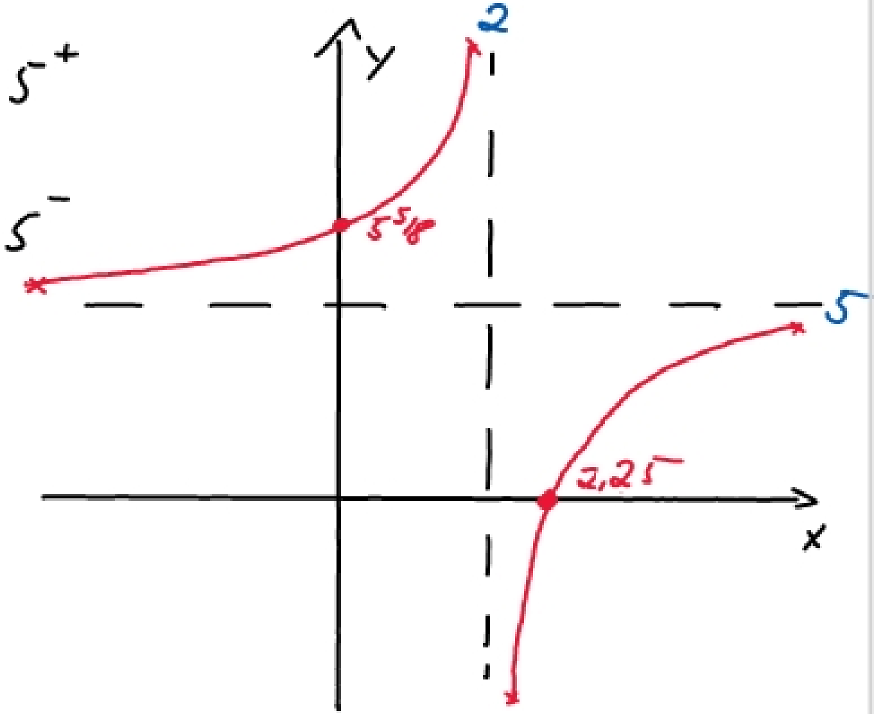
$\uparrow$

$f(x) = 0 = 3 + \frac{2}{x-4} \quad |-3 \qquad -3 = \frac{2}{x-4} \quad |\cdot(x-4) \qquad -3x+12=2 \Rightarrow \underline{\underline{x}} = \frac{10}{3}$

2) $f(x) = \frac{5}{8-4x} + 5$; $8-4x=0 \Rightarrow D = x \in \mathbb{R} \setminus \{2\}$

$\lim\limits_{x \to -\infty} f(x) = \left[\frac{5}{\infty} + 5\right] = \left[0^+ + 5\right] = 5^+$

$\lim\limits_{x \to \infty} f(x) = \left[\frac{5}{-\infty} + 5\right] = \left[0^- + 5\right] = 5^-$



$\lim\limits_{x \to 2^-} f(x) = \left[\frac{5}{0^+} + 5\right] = \infty$

$\lim\limits_{x \to 2^+} f(x) = \left[\frac{2}{0^-} + 5\right] = -\infty$

$f(0) = \frac{5}{8-0} + 5 = \underline{\underline{5\tfrac{5}{8}}}$

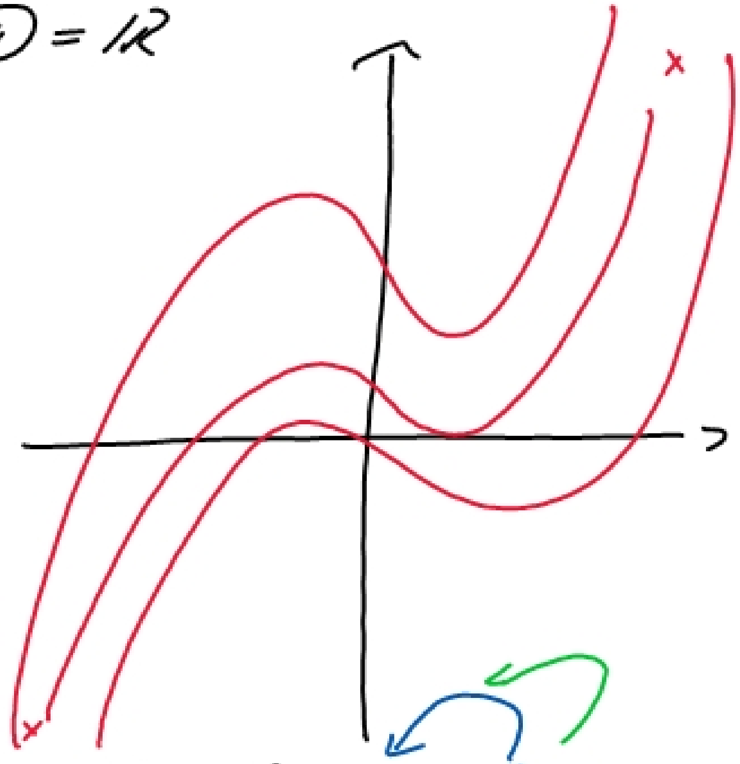
$W = y \in \mathbb{R} \setminus \{5\}$

$f(x) = 0 = \frac{5}{8-4x} + 5 \quad | -5 \qquad -5 = \frac{5}{8-4x} \quad | \cdot 8-4x \qquad -40+20x = 5 \;..\; x = 45/20$

$x = \underline{\underline{2{,}25}}$

$f(x) = x^3 - 2x^2 - 5x + 6 \qquad \mathbb{D} = \mathbb{R}$

ganzrationales Polynom vom Grade 3 $\Rightarrow$ stetig



$f(x) = 0 \qquad M_G = \{\pm 1; \pm 2; \pm 3; \pm 6\}$

Ziel: $f(x) = (x+a)(x+b)(x+c)$

$f(1) = 0 \Rightarrow (x-1)$ $\qquad f(x) = (x-1) \cdot ?!$

$$(x^3 - 2x^2 - 5x + 6) : (x-1) = x^2 - x - 6$$
$$\underline{-(x^3 - x^2)}$$
$$/ \quad -x^2 - 5x + 6$$
$$\underline{-(-x^2 + x)}$$
$$/ \quad -6x + 6$$
$$-(-6x + 6) \quad /$$

$$23156 : 11 = 21$$
$$\underline{-22}$$
$$1156$$
$$\underline{-11}$$
$$\ldots$$

$f(x) = (x-1) \cdot (x^2 - x - 6)$

$a \cdot b = -6$

$a + b = -1$

$= (x-1)(x-3)(x+2) = 0$

$\mathbb{L} = \{-2; 1; 3\}$

$$x^2 + \underline{\underline{p}} \cdot x + \underline{\underline{q}} = (x+a)(x+b) = x^2 + a\cdot x + b\cdot x + a\cdot b$$
$$= x^2 + \underline{\underline{(a+b)}}\cdot x \; + \underline{\underline{a\cdot b}}$$

$$x^2 - 5x - 24 = (x-8)(x+3)$$

$$f(x) = x^3 + 3x^2 - 4x - 12 = 0 \qquad M = \{\pm 1; \pm 2; \pm 3; \pm 4; \pm 6; \pm 12\}$$

$$f(1) = -12 <> 0$$
$$f(2) = 0 \;\rightarrow\; (x-2)$$

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

$$\mathbb{L} = \{-3; -2; 2\}$$

$$
\begin{array}{l}
(x^3 + 3x^2 - 4x - 12) : (x-2) = \underbrace{x^2 + 5x + 6}_{(x+2)(x+3)} \\
-(x^3 - 2x^2) \\
\hline
\quad / \;\; 5x^2 - 4x - 12 \\
\quad -(5x^2 - 10x) \\
\hline
\qquad / \;\; 6x - 12 \\
\qquad -(6x - 12) \\
\hline
\qquad\quad - \;\; -
\end{array}
$$

S 124 $\quad \frac{1}{2} \cdot \left(\frac{4}{3} + \frac{4}{5}\right) - \frac{2}{3} \cdot \left(\frac{3}{4} - \frac{1}{6}\right)$

$$\frac{1}{2} \cdot \left(\frac{20+12}{15}\right) - \frac{2}{3} \cdot \left(\frac{9-2}{12}\right)$$

$$\frac{1}{2} \cdot \frac{32}{15} - \frac{2}{3} \cdot \frac{7}{12} = \frac{16}{15} - \frac{7}{18}$$

$$\frac{96-35}{3 \cdot 5 \cdot 6} = \frac{61}{90}$$

$$\frac{\frac{2}{5} + \frac{4}{3}}{\frac{4}{5} - \frac{10}{13}} = \frac{\frac{6+20}{15}}{\frac{52-50}{65}} = \frac{\frac{26}{15}}{\frac{2}{65}} = \frac{\cancel{26}^{13}}{\cancel{15}_{3}} \cdot \frac{\cancel{65}^{13}}{\cancel{2}_{1}} = \frac{169}{3} = 56\frac{1}{3}$$