1) $$\frac{x^4 - 13x^2 + 36}{x^3 - 7x + 6} = f(x)$$

2) $$g(x) = \frac{2x^3 - 6x^2 - 20x + 48}{24 + 6x - 15x^2 + 3x^3}$$

Asymptoten

3) $$\sum_{k=2}^{\infty} (-1)^k \cdot \frac{\pi^{2k}}{(2k)!} - \frac{3}{k^2} \quad \rightarrow \text{Wert der Reihe}$$

4) $$\sum_{k=2}^{\infty} \left(1/\sqrt{2}\right)^{4k} \cdot \left(\frac{x}{3}\right)^{2k-1} \quad \rightarrow \text{Konvergenzbereich}$$

5) $$\sum_{k=1}^{\infty} x^k = x+1$$

$0x^2$

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

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

$\quad 2x^2 - 7x + 6$

$-(2x^2 - 4x)$

$\quad -3x + 6$

$-(-3x + 6)$

$\quad - \quad -$

$(x+3)(x-1)$

$\mathbb{D} = \mathbb{R} \setminus \{-3; 1; 2\}$

$x^4 - 13x^2 + 36 \qquad z = x^2$

$z^2 - 13z + 36 = (z-9)(z-4) \qquad z_1 = 4 \;;\; z_2 = 9$

$x_{1,2} = \pm\sqrt{4} = \pm 2 \qquad x_{3,4} = \pm\sqrt{9} = \pm 3$

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

$$f_e(x) = \frac{(x+2)(x-3)}{x-1} = \frac{x^2-x-6}{x-1} \quad ; \quad \mathbb{D} = \mathbb{R}\setminus\{1\}$$

behebbaren Lücken:

$x = -3$: $\quad \lim\limits_{x\to -3^+} f(x) = \lim\limits_{x\to -3^-} f(x) = f_e(-3) = -3/2$

$x = 2$: $\quad \lim\limits_{x\to 2^+} f(x) = \lim\limits_{x\to 2^-} f(x) = f_e(2) = -4$

$\lim\limits_{x\to 1^+} f(x) = \frac{-6}{0^+} = -\infty \quad ; \quad \lim\limits_{x\to 1^-} f(x) = \frac{-6}{0^-} = \infty$

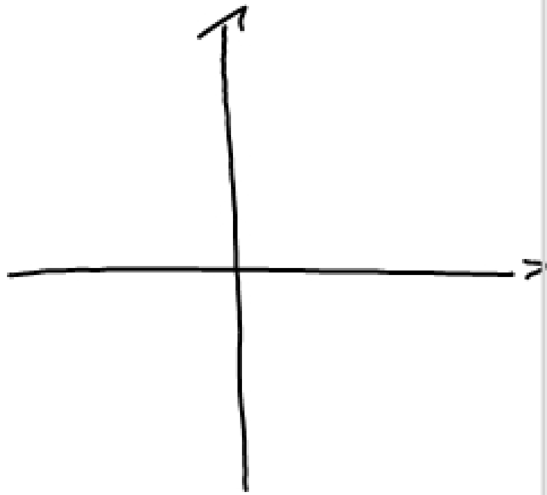
$\Rightarrow$ senkrechte Asymptote (Pol mit VZW)

$$\lim_{x\to\infty} \frac{x^2-x-6}{x-1} = \lim_{x\to\infty} \frac{x^2\cdot\left(1\overbrace{-\tfrac{1}{x}-\tfrac{6}{x^2}}^{\to 0}\right)}{x\left(1-\underbrace{\tfrac{1}{x}}_{\to 0}\right)} = [x] = \infty$$

$\Rightarrow$ diagonale Asymptote

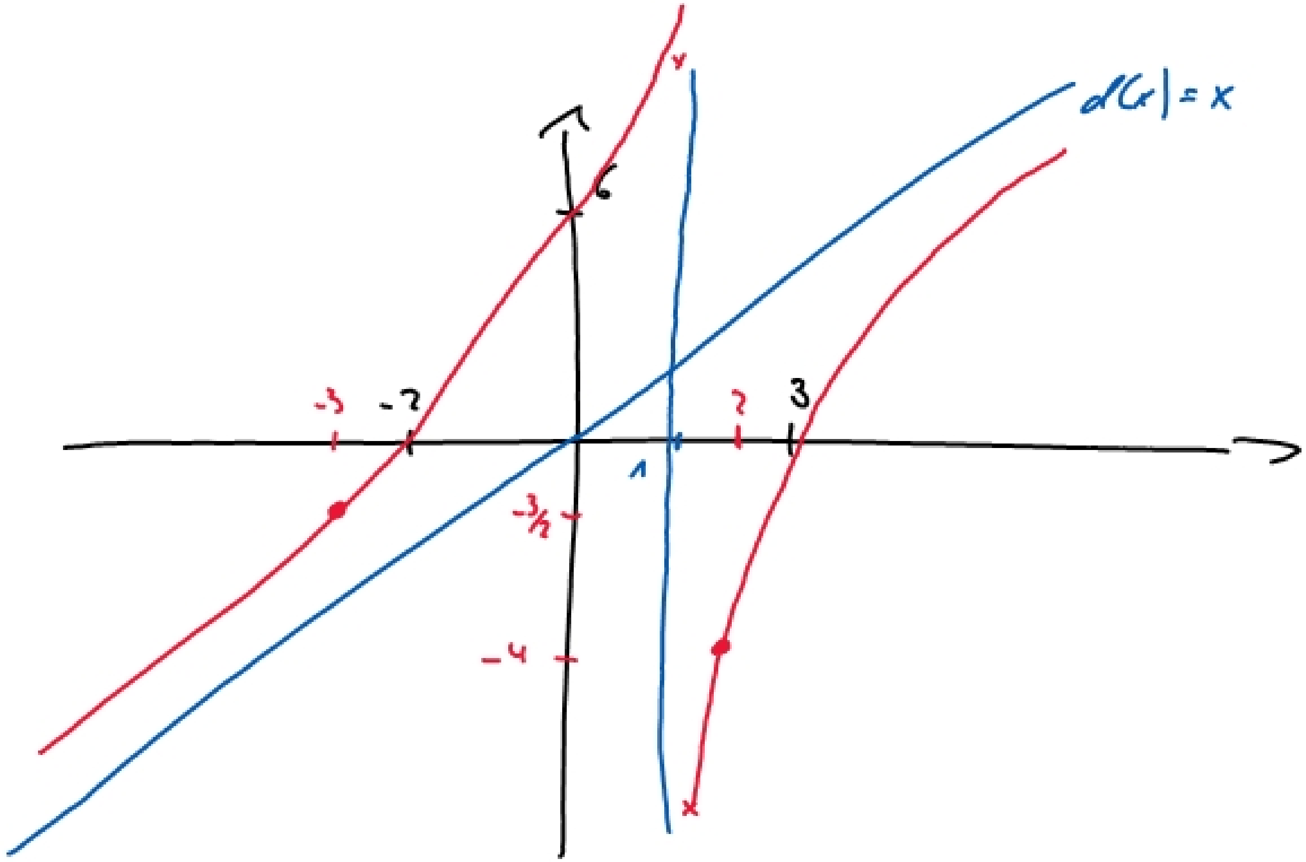
$$(x^2-x-6)(x-1) = \underbrace{x}_{d(x)=x} - \underbrace{\frac{6}{x-1}}_{\to 0}$$

$$\frac{(x^2-x)}{/ \quad / \quad -6}$$



S_x : $f(x)=0$ $\quad S_{x_1}(-2|0)$, $S_{x_2}(3|0)$

S_y : $f(0) = \frac{(0+2)(0-3)}{0-1} = 6 \quad S_y(0|6)$


d(x) = x
6
-3
-2
2
3
1
-3/2
-4

4) $\sum \left(1/\sqrt{2}\right)^{4k} \cdot \left(\frac{x}{3}\right)^{2k-1}$

$\sum \left[\left(1/\sqrt{2}\right)^{4}\right]^{k} \left(\frac{x}{3}\right)^{2k} \cdot \left(\frac{x}{3}\right)^{-1}$

$\sum \left[\frac{1}{(2^{1/2})^{4}}\right]^{k} \left[\left(\frac{x}{3}\right)^{2}\right]^{k} \frac{3}{x}$

$\frac{3}{x} \cdot \sum \left(\frac{1}{4}\right)^{k} \cdot \left(\frac{x^2}{9}\right)^{k} = \frac{3}{x} \cdot \sum \left(\frac{1}{4} \cdot \frac{x^2}{9}\right)^{k}$

$\frac{3}{x} \cdot \sum \left(\frac{x^2}{36}\right)^{k} \hat{=} \sum q^{k}$ => konvergent $|q| < 1$

$\frac{x^2}{36} < 1$ $\boxed{x \in \left]-6; 6\right[}$ Konvergenzbereich

Randbetrachtung $x = \pm 6$ => $\frac{3}{\pm 6} \sum 1^{k}$ => divergent