13. Klasse, 1. SA Analysis, 30.11.16

1a) $D = \mathbb{R} \setminus \{0\}$ ✓

$f(-1) = \frac{-1-3+4}{-1} = 0$ ✓ $\Rightarrow x_1 = -1$

$x^3 - 3x^2 + 4 : (x+1) = x^2 - 4x + 4$ ✓

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

$-4x^2 + 4$

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

$4x + 4$

$-(4x + 4)$

0

$x_{2/3}$: $x^2 - 4x + 4 = (x-2)^2$ $\Rightarrow x_{2/3} = 2$ ✓ doppelt

(alternativ: Mitternachtsformel)

b) $\lim\limits_{x \to -\infty} f(x) = -\infty$ ✓

$\lim\limits_{x \to 0} f(x) = +\infty$ ✓

c) senkrechte Asymptote: $x = 0$ ✓

waagrechte Asymptote: $y = 1$ ✓ $\left((x^3 - 3x^2 + 4) : x^3 = \underline{1} + \frac{-3x^2+4}{x^3}$ ✓

$-x^3$

$-3x^2 + 4 \right)$

$\lim\limits_{x \to -\infty} \frac{-3x^2+4}{x^3} = 0^+$ $\Rightarrow$ Annäherung von oben ✓

$\lim\limits_{x \to +\infty} \frac{-3x^2+4}{x^3} = 0^-$ $\Rightarrow$ Annäherung von unten ✓ ✱SP

d) $f'(x) = \frac{x^3(3x^2-6x) - (x^3-3x^2+4)\cdot 3x^2}{x^6}$ ✓ $= \frac{x(3x^2-6x) - (x^3-3x^2+4)\cdot 3}{x^4}$ ✓

$= \frac{3x^3 - 6x^2 - 3x^3 + 9x^2 - 12}{x^4} = \frac{3x^2 - 12}{x^4}$ ✓

$f'(x) = 0$

$3x^2 - 12 = 0$

$x^2 = 4$

$x_{1/2} = \pm 2$ ✓

$f(-2) = 2$ $\Rightarrow E_1(-2|2)$ ✗

$f(2) = 0$ $\Rightarrow E_2(2|0)$ ✗

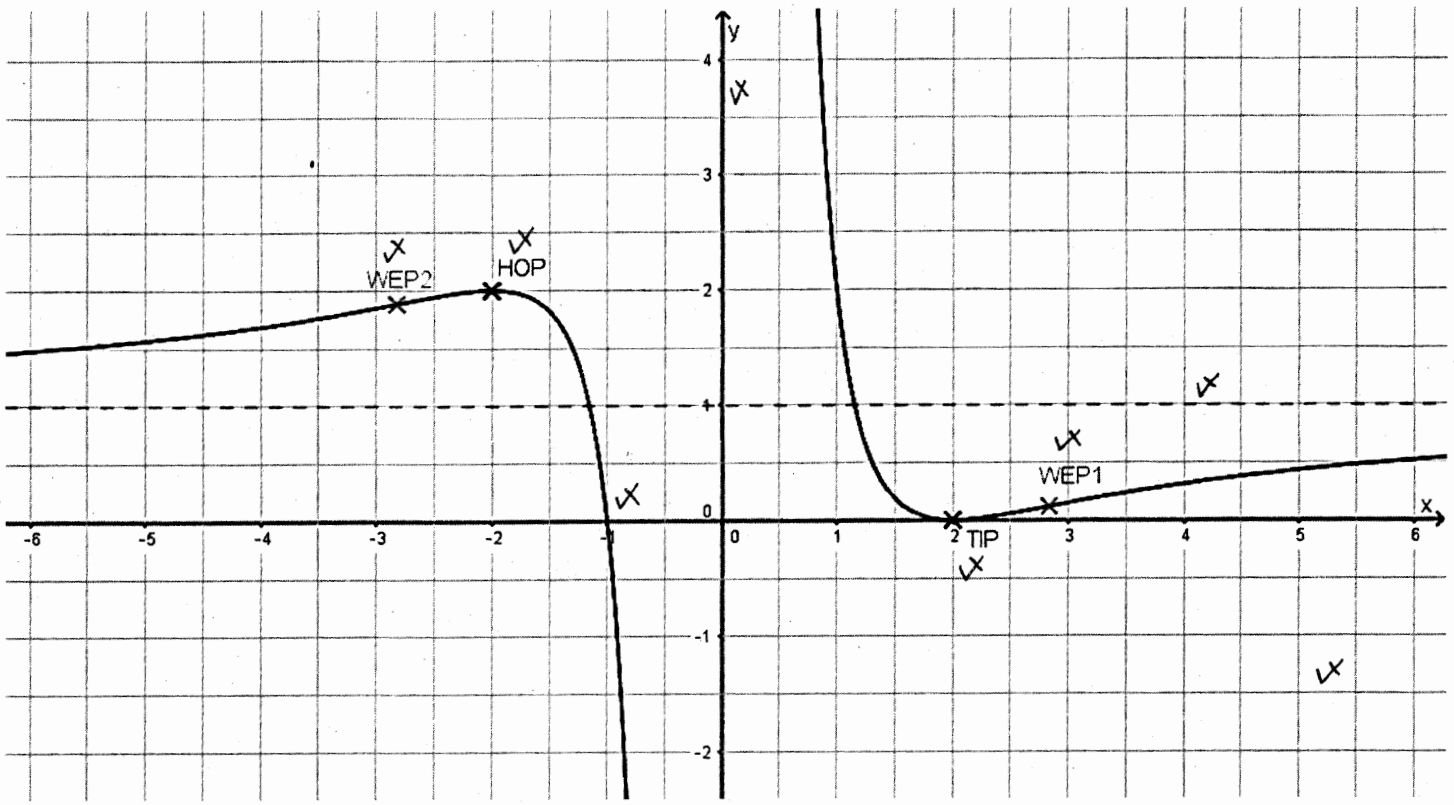
✱✱ alternativ: Monotonietafel

$f''(x) = \frac{x^4(6x) - (3x^2-12)\cdot 4x^3}{x^8}$ ✓ $= \frac{6x^2 - (3x^2-12)\cdot 4}{x^5} = \frac{6x^2 - 12x^2 + 48}{x^5} = \frac{-6x^2+48}{x^5}$ ✓

$f''(-2) = \frac{-6\cdot 4 + 48}{(-2)^5} < 0$ $\Rightarrow E_1$ ist HOP ✓

$f''(2) = \frac{-6\cdot 4 + 48}{2^5} > 0$ $\Rightarrow E_2$ ist TIP ✓

e)



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

* 1 c) $1 = 1 + \dfrac{-3x^2+4}{x^3}$

$\dfrac{-3x^2+4}{x^3} = 0$

$-3x^2+4 = 0$ ✓

$3x^2 = 4 \mid :3$

$x^2 = \frac{4}{3} \mid \sqrt{\ }$

$x_{1/2} \approx \pm 1{,}15$ ✓ $\Rightarrow$ $S_1(-1{,}15 \mid 1)$

$S_2(1{,}15 \mid 1)$

** Monotonie

x	x <	-2	< x <	0	< x <	2	< x
f'	+		−	∄	−		+
Graph	steigt	HOP	fällt		fällt	TIP	steigt

✓ ✓ ✓ ✓