1) $f(x) = (x-1) \cdot e^{-|x|}$ stetig / diff ?

2) $f(x) = x^3 - 6x^2 + 8x + 42$ Wendetangente

3) $f(x) = 2 \cdot \sin(3x^3 - 5\sqrt{x^7})$

4) $g(x) = \ln\left(\frac{3}{x^3}\right)$

5) $h(x) = 2 \cdot (x^3 - \sin(4x))^5$

6) $k(x) = \sqrt[3]{e^{2x+1} - 4} \cdot \sin(3x)$

} $f(x)$ II

7) $f(x) = x^3 - 2x^2 - 5x + 6$

a) Tangenten in den NS

b) Schnittpunkte aus a) "

1) $f(x) = \begin{cases} (x-1)\cdot e^{-x} = x\cdot e^{-x} - e^{-x} ; & x \geq 0 \\ (x-1)\cdot e^{x} = x\cdot e^{x} - e^{x} ; & x < 0 \end{cases}$

$f'(x) = \begin{cases} 1\cdot e^{-x} + x\cdot e^{-x}\cdot(-1) - e^{-x}\cdot(-1) = 2e^{-x} - x\cdot e^{-x} ; & x \geq 0 \\ 1\cdot e^{x} + x\cdot e^{x}\cdot 1 - e^{x}\cdot 1 = x\cdot e^{x} ; & x < 0 \end{cases}$

$\lim\limits_{x\to 0^+} f'(x) = \lim\limits_{x\to 0^-} f'(x) = f'(0)$

$2\cdot e^{-0} - 0\cdot e^{-0} = 0\cdot e^{0} = 2\cdot e^{-0} - 0\cdot e^{-0}$

$2 = 0$ ↯

$\Rightarrow$ nicht differenzierbar

2) $f(x) = x^3 - 6x^2 + 8x + 42$ (y-Koordinate)

$f'(x) = 3x^2 - 12x + 8$ (Steigung)

$f''(x) = 6x - 12$ (Krümmung)

$f(WS)$ ↑ $f'(WS)$ ↗

$y = m \cdot x + b$

↓

WS

$f''(x) = 0 \Rightarrow x = 2$

$f(2) = 8 - 24 + 16 + 42 = 42$

$f'(2) = 12 - 24 + 8 = -4$

$y = -4 \cdot x + b$

$42 = -4 \cdot 2 + b$

$b = 50$

$\Rightarrow y = -4 \cdot x + 50$

3) $f'(x) = 2 \cdot \cos(3x^3 - 5\sqrt{x}) \cdot (9x^2 - \frac{5}{2\sqrt{x}})$

4) $f'(x) = \frac{1}{\frac{3}{x^3}} \cdot (-9 \cdot x^{-4}) = \frac{-9}{3} \cdot \frac{x^3}{x^4} = -3 \cdot \frac{1}{x} = -\frac{3}{x}$

$f(x) = \ln(3 \cdot x^{-3}) \Rightarrow f'(x) = \frac{1}{3 \cdot x^{-3}} \cdot (-9 \cdot x^{-4})$

$= \frac{-9}{3} \cdot \frac{x^{-4}}{x^{-3}} = -3 \cdot x^{-1}$

3) $D = \mathbb{R}^{\neq 0}$; 4) $D = \mathbb{R}^{>0}$

D:

1) $\sqrt[n]{\heartsuit}$; n ungerade $\heartsuit \geq 0$

2) $\frac{1}{\heartsuit}$; $\heartsuit \neq 0$

3) $\ln(\heartsuit)$; $\heartsuit > 0$

$$\frac{4}{x-3} > 0 \qquad | \cdot (x-3)$$

	$x > 3$	δ^+	$x < 3$	δ^-
R	$4 > 0 \cdot (x-3)$ $4 > 0$	✓	$4 < 0 \cdot (x-3)$ $4 < 0$	↯
M	$x > 3$		$\{\}$	
P	$x = 4 : \frac{4}{4-3} = 4 > 0$	✓	↯	

L

$$\{x \in \mathbb{R} \mid x > 3\}$$