$$f(x) = x^4 - 18x^2 + 9$$

$$f'(x) = 4x^3 - 36x = 4x(x^2 - 9) = \underline{4x(x-3)(x+3)}$$

$$D(f) = R$$

$$f'(x) = 0 \iff x \in \{0, 3, -3\}$$

$-3 \quad 0 \quad 3$

	$(-\infty, -3)$	$(-3, 0)$	$(0, 3)$	$(3, \infty)$
f'	$-$	$+$	$-$	$+$
f	$\searrow$	$\nearrow$	$\searrow$	$\nearrow$

rast. na $(-3, 0)$ a na $(3, \infty)$

kles. na $(-\infty, -3)$ a na $(0, 3)$

lok min. ..... v $-3, 3$ $\quad f(-3) = -72 \quad f(3) = -72$

lok max. ..... v 0 $\quad f(0) = 9$

$$f'(x) = 4x^3 - 36x$$

$$f''(x) = 12x^2 - 36 = 12(x^2 - 3) = 12(x - \sqrt{3})(x + \sqrt{3})$$

$$f''(x) = 0 \iff x \in \{-\sqrt{3}, \sqrt{3}\}$$

$-\sqrt{3} \quad \sqrt{3}$

	$(-\infty, -\sqrt{3})$	$(-\sqrt{3}, \sqrt{3})$	$(\sqrt{3}, \infty)$
f''	$+$	$-$	$+$
f	$\cup$	$\cap$	$\cup$

konvexná ..... na $(-\infty, -\sqrt{3})$ a na $(\sqrt{3}, \infty)$

konkávna ..... na $(-\sqrt{3}, \sqrt{3})$

inflexné body $-\sqrt{3}, \sqrt{3}$

$f(x) = x + \frac{1}{x}$ $\qquad D(f) = \mathbb{R} \setminus \{0\}$

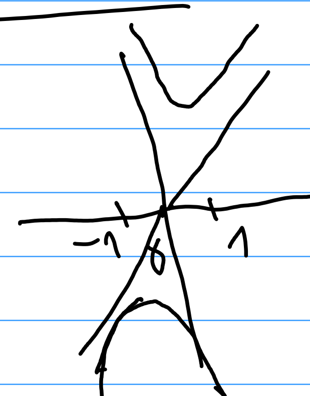
$f'(x) = 1 - 1x^{-2} = 1 - \frac{1}{x^2}$

$f'(x) = 0 \qquad 1 - \frac{1}{x^2} = \frac{x^2 - 1}{x^2} = \frac{(x-1)(x+1)}{x^2}$

$f'(x) = 0 \Leftrightarrow x \in \{-1, 1\}$

$-1 \qquad 0 \qquad 1$

	$(-\infty,-1)$	$(-1,0)$	$(0,1)$	$(1,\infty)$
f'	$+$	$-$	$-$	$+$
f	$\nearrow$	$\searrow$	$\searrow$	$\nearrow$



rost. .... na $(-\infty,-1)$ a na $(1,\infty)$

kles. .... na $(-1,0)$ a na $(0,1)$

$(-\infty,-1) \cup (1,\infty)$

$(-1,0) \cup (0,1)$

lok. min .... v 1 $\qquad f''(-1) = 2 \cdot (-1)^{-3} = -2 < 0$ max

lok. max .... v -1 $\qquad f''(1) = 2 \cdot 1^{-3} = 2 > 0$ min

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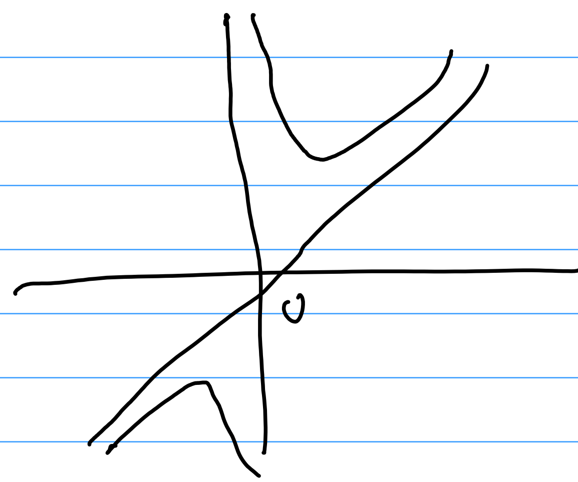
$f''(x) = \left(1 - \frac{1}{x^2}\right)' = -2x^{-3}$ $\qquad \frac{2}{x^3} = 2x^{-3}$

0

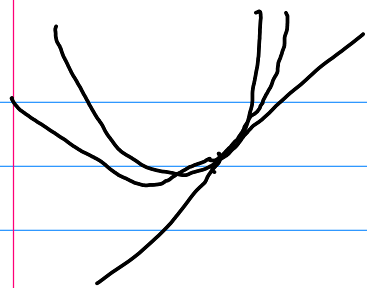
$f''(x) = 0$ nikdy

	$(-\infty,0)$	$(0,\infty)$
f''	$-$	$+$
f	$\frown$	$\smile$

infl. body nemá



Taylorov polynóm



$f(x) = \frac{1}{x}$ $\qquad a=2,$ st. 3

$$T_n(x) = f(a) + \frac{f'(a)}{1!}(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \dots + \frac{f^{(n)}(a)}{n!}(x-a)^n$$

$f'(x) = (x^{-1})' = -1x^{-2} = -\frac{1}{x^2}$ $\qquad f(2) = \frac{1}{2}$

$f''(x) = \left(-\frac{1}{x^2}\right)' = (-x^{-2})' = 2x^{-3}$ $\qquad f'(2) = -\frac{1}{4}$

$f'''(x) = (2x^{-3})' = -6x^{-4}$ $\qquad f''(2) = \frac{2}{8} = \frac{1}{4}$

$f'''(2) = -\frac{6}{16} = -\frac{3}{8}$

$$T_3(x) = \frac{1}{2} - \frac{1}{4}(x-2) + \frac{1}{4}\cdot\frac{1}{2!}(x-2)^2 - \frac{3}{8}\cdot\frac{1}{3!}(x-2)^3 = \frac{1}{2} - \frac{1}{4}(x-2) + \frac{1}{8}(x-2)^2 - \frac{1}{16}(x-2)^3$$

$x = 2{,}1$ $\qquad f(2{,}1) = \frac{1}{2{,}1} = 0{,}4761904$

$$T_3(2{,}1) = \frac{1}{2} - \frac{1}{4}0{,}1 + \frac{1}{8}0{,}1^2 - \frac{1}{16}0{,}1^3 = 0{,}4761875$$

$T_1(x) = f(a) + f'(a)(x-a)$

$$T_1(2{,}1) = \frac{1}{2} - \frac{1}{4}\cdot 0{,}1 = 0{,}475$$

$f(x) = e^x$ $\qquad a=0,$ st. 5

$f'(x) = e^x,\ f''(x) = e^x,\ f'''(x) = e^x,\ f^{(4)}(x) = e^x,\ f^{(5)}(x) = e^x$

$f(0) = f'(0) = f''(0) = \dots = f^{(5)}(0) = e^0 = 1$

$$e^x = 1 + \frac{1}{1!}x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \frac{1}{4!}x^4 + \frac{1}{5!}x^5$$