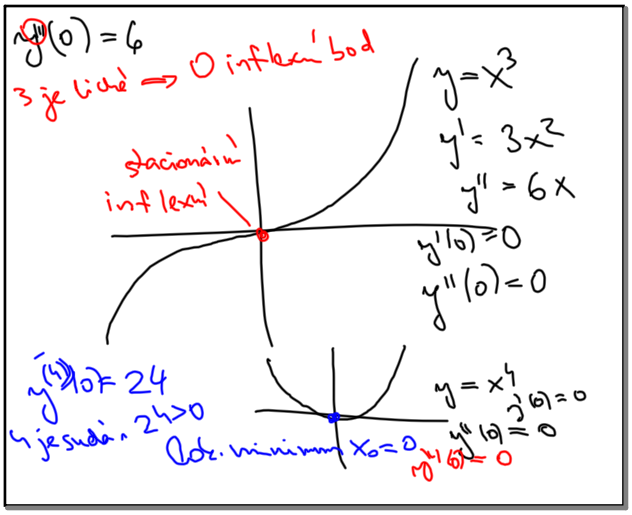

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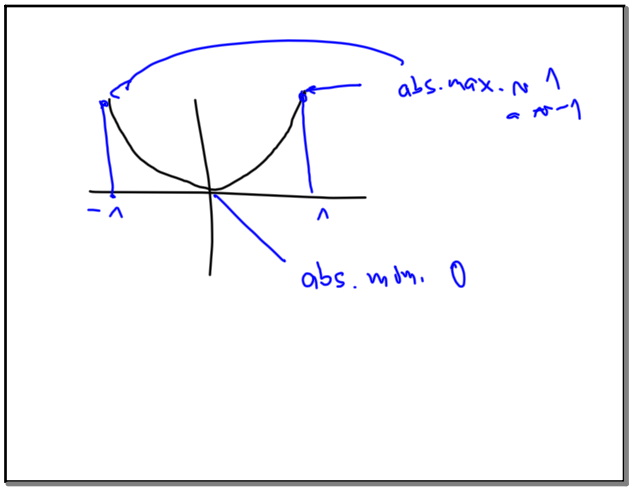

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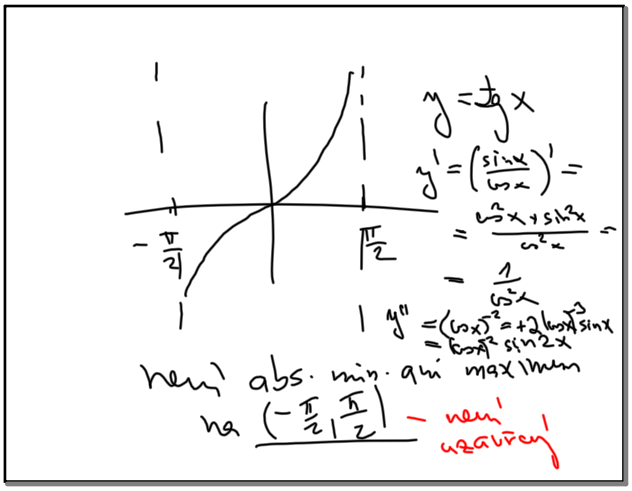

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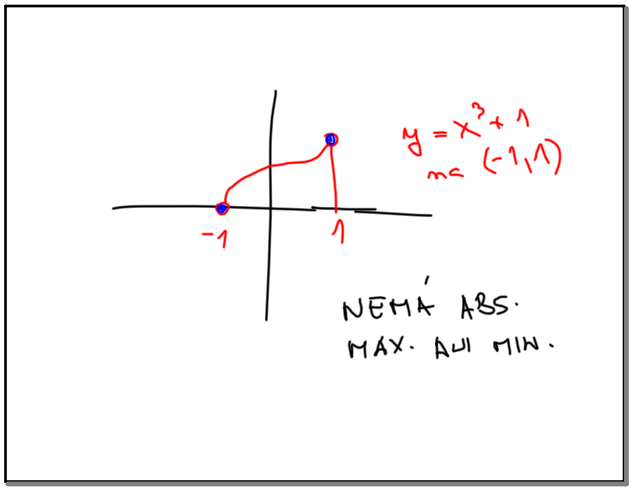

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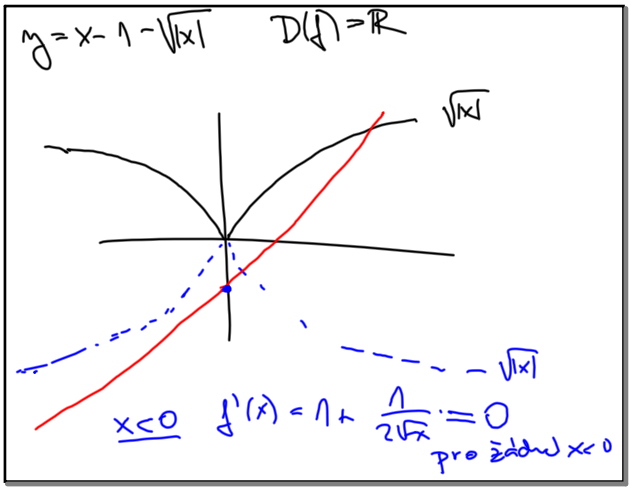

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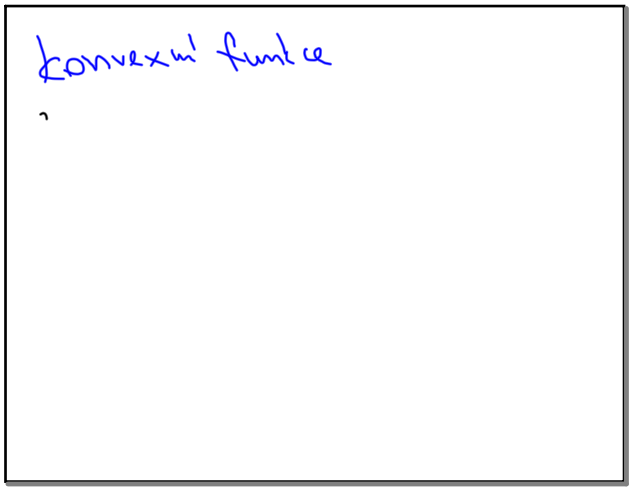

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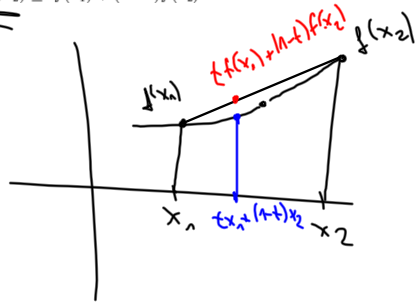
A real valued function $f : X \to \mathbf{R}$ defined on a convex set X in a vector s
and any $t \in [0, 1]$.

$$f(tx_1 + (1-t)x_2) \le tf(x_1) + (1-t)f(x_2).$$



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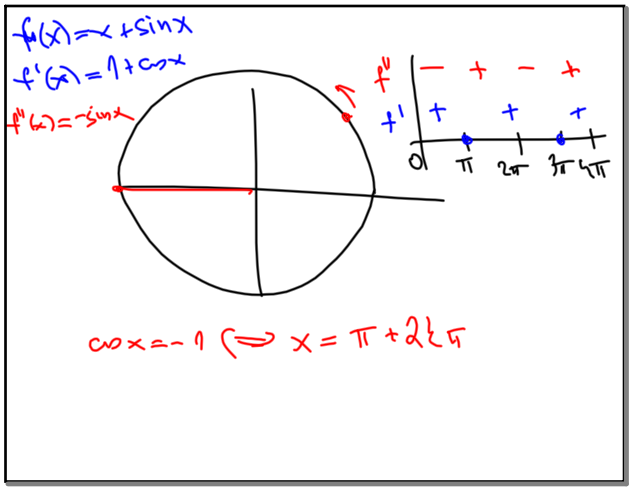

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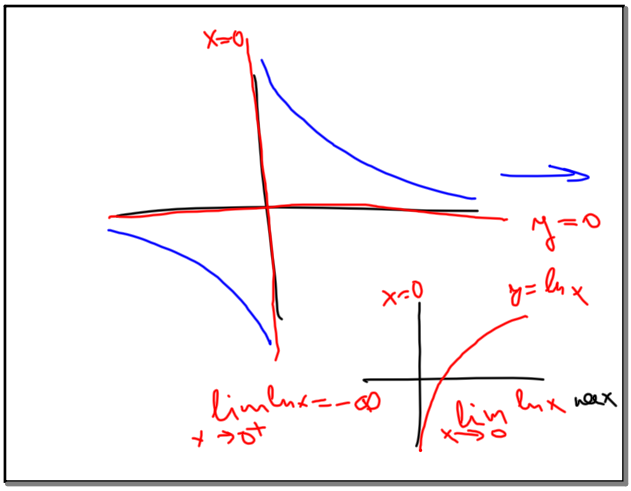

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Příklad

Určete asymptoty funkce

$$f(x) = \frac{(x-2)^3}{(x+2)^2}.$$

bez směrnice: kandidát je pouze $x = -2$

$$\lim_{x \to -2} \frac{(x-2)^3}{(x+2)^2} = \frac{0\text{kn.}}{0^+} = +\infty$$

vyhovuje ⇒ asymptota bez směrnice $x = -2$

se směrnicí:

$$a = \lim_{x \to \pm\infty} \frac{(x-2)^3}{(x+2)^2 x} = \lim \frac{x^3 - 6x^2 + \dots}{x^3 + 4x^2 + \dots} =$$

$$= \lim_{x \to \pm\infty} \frac{1 - \frac{6}{x} + \dots}{1 + \frac{4}{x} + \dots} = 1$$

$$b = \lim_{x \to \pm\infty} \frac{(x-2)^3}{(x+2)^2} - x = \lim_{x \to \pm\infty} \frac{(x-2)^3 - x(x+2)^2}{(x+2)^2} =$$

$$= \lim_{x \to \pm\infty} \frac{(x^3 - 6x^2 + \dots) - (x^3 + 4x^2 + 4x)}{x^2 + 4x + 4} = -10$$

se směrnicí pro ∞ i $-\infty$ je

$$y = 1 \cdot x - 10$$

10 26-13:03

$$f(x) = \frac{1}{x} + \ln x$$

$$\lim_{x \to 0^+} \left| \frac{1}{x} + \ln x \right| = \lim_{x \to 0^+} \frac{1 + x \ln x}{x} =$$

$$= \lim_{x \to 0^+} \frac{\frac{1}{x} + \ln x}{1} = \lim_{x \to 0^+} 1 + \ln x = -\infty$$

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

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

asymptoty se sm.

$$a = \lim_{x \to +\infty} \frac{f(x)}{x} = \lim_{x \to +\infty} \frac{\frac{1}{x} + \ln x}{x} = \lim_{x \to +\infty} \left(\frac{1}{x^2} + \frac{\ln x}{x}\right)$$

$$= 0$$

$$b = \lim_{x \to +\infty} f(x) - 0 \cdot x = \lim_{x \to \infty} \frac{1}{x} + \ln x =$$

$$= +\infty \Rightarrow \text{neexistuje}$$

as. se směrnicí

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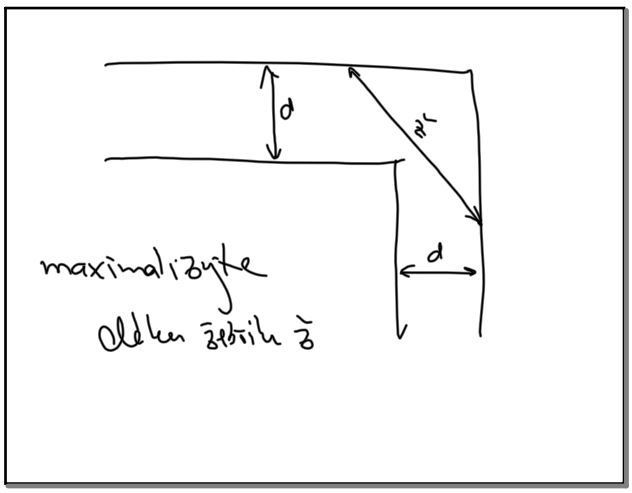

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