A CSOPORT:

(1) (a) SZEKENNECT JEGYZET 79. OLDAL

(b) 80. OLDAL

(c) $f(x)=x^3$, $x_0=0$, 79. OLDAL

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(2) $$\frac{2n-1}{2n+\sqrt{3n}} = \underbrace{\frac{2n+\sqrt{3n}}{2n+\sqrt{3n}}}_{=1} - \frac{\sqrt{3n}+1}{2n+\sqrt{3n}} = 1+a_n$$

$\boxed{\text{JOLLY-JOKER}}$ (79. OLDAL): $b_n = \sqrt{3n}+1$

$$\lim_{n\to\infty} a_n \cdot b_n = -\lim_{n\to\infty} \frac{(\sqrt{3n}+1)\cdot(\sqrt{3n}+1)}{2n+\sqrt{3n}} = -\frac{3}{2}$$

$$\lim_{n\to\infty} (1+a_n)^{b_n} = \exp\left(-\tfrac{3}{2}\right) = e^{-3/2}$$

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(3) a) $$\frac{d}{dx} \ln(\cos(x^3-x)) =$$

$$= \ln'(\cos(x^3-x)) \cdot \cos'(x^3-x) \cdot (x^3-x)' =$$

$$= \frac{1}{\cos(x^3-x)} \cdot (-\sin(x^3-x)) \cdot (3x^2-1) =$$

$$= \tan(x^3-x) \cdot (1-3x^2)$$

(3) b) $(\ln(x))^{\sqrt{2x}} = \exp\left(\sqrt{2x}\cdot\ln(\ln(x))\right) = f(x)$

$$f'(x) = \exp\left(\sqrt{2x}\cdot\ln(\ln(x))\right)\cdot\left(\sqrt{2x}\cdot\ln(\ln(x))\right)' =$$

$$= \ln(x)^{\sqrt{2x}}\cdot\left(\frac{1}{2}\cdot\frac{1}{\sqrt{2x}}\cdot 2\cdot\ln(\ln(x)) + \sqrt{2x}\cdot\frac{1}{\ln(x)}\cdot\frac{1}{x}\right)$$

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(4) $\lim\limits_{x\to 0_-} f(x) = A\cdot e^{2\cdot 0} + \sin(0) = A$

$\boxed{2x=y}$

$$\lim_{x\to 0_+} f(x) = \lim_{x\to 0_+}\left(\frac{1}{\operatorname{sh}(2x)} - \frac{1}{2x}\right) =$$

$$= \lim_{x\to 0_+}\left(\frac{1}{\operatorname{sh}(x)} - \frac{1}{x}\right) = \lim_{x\to 0}\frac{x-\operatorname{sh}(x)}{x\cdot\operatorname{sh}(x)} \overset{\frac{0}{0},\,L'H}{=}$$

$$= \lim_{x\to 0}\frac{1-\operatorname{ch}(x)}{\operatorname{sh}(x)+x\cdot\operatorname{ch}(x)} \overset{\frac{0}{0},\,L'H}{=} \lim_{x\to 0}\frac{-\operatorname{sh}(x)}{\operatorname{ch}(x)+\operatorname{ch}(x)+x\cdot\operatorname{sh}(x)} = \frac{0}{2} = 0$$

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(5) $f'(x) = e^{3x} + x\cdot 3\cdot e^{3x} = (1+3x)\cdot e^{3x}$

$f'(x) > 0 \iff 1+3x > 0 \iff \boxed{x > -\frac{1}{3}} \Rightarrow \boxed{\left(-\frac{1}{3}, +\infty\right)\text{-EN NŐ}}$

$f'(x) < 0 \iff 1+3x < 0 \longrightarrow \boxed{\left(-\infty, -\frac{1}{3}\right)\text{-ON CSÖKK}}$

$f''(x) = 3\cdot e^{3x} + (1+3x)\cdot 3\cdot e^{3x} = (6+9x)\cdot e^{3x}$

$f''(x) > 0 \iff 6+9x > 0 \implies \left(-\frac{2}{3}, +\infty\right)$- EN KONVEX

$f''(x) < 0 \iff 6+9x < 0 \implies \left(-\infty, -\frac{2}{3}\right)$- ON KONKÁV