(1) $\lim\limits_{x \to -3} \dfrac{x^3+4x^2+3x}{x+3} \overset{\text{l'H}}{\underset{0/0}{=}} \lim\limits_{x\to -3} \dfrac{3x^2+8x+3}{1} \overset{AL}{=} 3\cdot 9 - 8\cdot 3 + 3 = \underline{\underline{6}}$

2 4 2 2

jinak $\lim\limits_{x\to -3} \dfrac{\cancel{(x+3)}(x^2+x)}{\cancel{x+3}} \overset{AL}{=} (-3)^2 + 3 = \underline{\underline{6}}$

6 2 2

→ spojitost

6 2 2

(2) $\lim\limits_{x\to 1} \dfrac{1-\sqrt{2-x}}{x} \overset{AL}{=} \dfrac{1-1}{1} = 0$

nebo $= \lim\limits_{x\to 1} \dfrac{1}{1+\sqrt{2-x}} \cdot \dfrac{1-2+x}{x} \overset{AL}{=} \dfrac{1-1}{(1+\sqrt{2-1})\cdot 1} = 0$

5 3 2

(3) $f = e^{2x}(\sqrt{x} - \log x)$

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

8

$D_f = (0,\infty) = D_{f'}$ 2

① $\lim\limits_{x\to -1} \dfrac{x^3+x^2+2x+2}{x+1} \overset{LH}{\underset{\frac{0}{0}}{=}} \lim \dfrac{3x^2+2x+2}{1} \overset{AL}{=} 3\cdot 1 - 2 + 2 = \underline{\underline{3}}$

jinak $\lim\limits_{x\to -1} \dfrac{(x^2+2)\cancel{(x+1)}}{\cancel{(x+1)}} \overset{AL}{=} 1+2 = \underline{\underline{3}}$

② $\lim\limits_{x\to 2} \dfrac{3-\sqrt{7+x}}{x-2} = \lim\limits_{x\to 2} \dfrac{\overbrace{9-7-x}^{2-x}}{3+\sqrt{7+x}} \cdot \dfrac{1}{x-2} = \dfrac{-1}{3+\sqrt{9}} = \underline{\underline{-\dfrac{1}{6}}}$

③ $f(x) = \dfrac{\tan x - \sin(x^6)}{e^x}$

$f' = \dfrac{e^x\left(\frac{1}{\cos^2 x} - \cos(x^6)\cdot 6x^5\right) - e^x(\tan x - \sin(x^6))}{e^{2x}}$

$D_f = D_f' = \mathbb{R} \setminus \{ \frac{\pi}{2} + 2\pi,\ k \in \mathbb{Z} \}$

(1)

$$\lim_{x\to 2} \frac{x^3-2x^2-x+2}{x-2} \overset{LH}{\underset{\frac{0}{0}}{=}} \lim_{x\to 2} \frac{3x^2-4x-1}{1} \overset{AL}{=} 12-8-1 = 3$$

nebo

$$\lim_{x\to 2} \frac{\cancel{(x-2)}(x^2-1)}{\cancel{(x-2)}} \overset{AL}{=} \underline{\underline{3}}$$

(2)

$$\lim_{x\to -2} \frac{1-\sqrt{3+x}}{x+2} = \lim_{x\to -2} \frac{1}{1+\sqrt{3+x}} \cdot \frac{\overbrace{1-(3+x)}^{-2-x}}{x+2} \overset{AL}{=} -1 \cdot \frac{1}{1+\sqrt{3-2}} = \underline{\underline{-1/2}}$$

(3)

$$f(x) = \arctan(x^5 \cos x)$$

$$f' = \frac{1}{1+(x^5\cos x)^2} \cdot \left(5x^4 \cos x + x^5(-\sin x)\right)$$