EXTRÉMY

(a) $f(x) = \operatorname{arccotg} \frac{1}{x}$ $\qquad D(f): \mathbb{R} - \{0\}$

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

$$= \frac{\cancel{x^2}}{x^2+1} \cdot \frac{-1}{\cancel{x^2}} = \frac{-1}{x^2+1} \quad \begin{matrix} - \\ + \end{matrix} \quad -$$

$(-\infty, 0)$	$(0, \infty)$
$\searrow$	$\searrow$

$f'(x) \neq 0 \qquad \nexists$ STAC. BODY

KLESÁ $\Rightarrow$ NEMÁ LOK. EXT

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

$+$

$$f''(x) = 0 \iff 2x = 0 \iff x = 0, \quad x = 0 \notin D(f)!$$

$(-\infty, 0)$	$(0, \infty)$
$-$	$+$
$\cap$	$\cup$

FUNKCIA NEMÁ INFLEXNÝ BOD, LEBO

$x = 0 \notin D(f)$

(b) $\boxed{f(x) = x e^{-\frac{x^2}{2}}}$ $\qquad D(f) = \mathbb{R}$

$$f'(x) = 1 \cdot e^{-\frac{x^2}{2}} + x e^{-\frac{x^2}{2}} \cdot \left(-\frac{\cancel{2}x}{\cancel{2}}\right) = \boxed{e^{-\frac{x^2}{2}}\left(1 - x^2\right)}$$

$$f'(x) = 0 \iff e^{-\frac{x^2}{2}}\left(1 - x^2\right) = 0$$

$$1 - x^2 = 0 \iff x = \pm 1$$

SB

−		+		−
	−1		1	
↘		↗		↘

$$f''(x) = \left[e^{-\frac{x^2}{2}}(1-x^2)\right]' = e^{-\frac{x^2}{2}} \cdot \left(\frac{-\cancel{2}x}{\cancel{2}}\right)(1-x^2) +$$

$$+ e^{-\frac{x^2}{2}} \cdot (-2x) = e^{-\frac{x^2}{2}}\left(-x + x^3 - 2x\right) = e^{-\frac{x^2}{2}}\left(x^3 - 3x\right)$$

$$= \boxed{e^{-\frac{x^2}{2}} \cdot x\left(x^2 - 3\right)}$$

$$* \quad f''(-1) = e^{-\frac{(-1)^2}{2}} \cdot (-1)\left((-1)^2 - 3\right) = e^{-\frac{1}{2}} \cdot (-1)(-2) =$$

$$= 2e^{-\frac{1}{2}} > 0 \Rightarrow$$ FUNKCIA MÁ V BODE $x = -1$ LOK. MIN.

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

$\underbrace{A\left[-1, -e^{-\frac{1}{2}}\right]}_{\text{LOK. MIN}}$

$$f''(1) = e^{-\frac{1}{2}} \cdot 1(1-3) = -2e^{-\frac{1}{2}} < 0$$

→ V BODE $X=1$ MÁ FUNKCIA

LOK MAX.

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

$B\left[1, e^{-\frac{1}{2}}\right]$

(c) $f(x) = \dfrac{2}{e^x - 3}$

$D(f)$: $e^x - 3 \neq 0$

$e^x \neq 3$

$\ln e^x \neq \ln 3$

$x \ln e \neq \ln 3$

$x \neq \ln 3$

$D(f): R - \{\ln 3\}$

$f'(x) = \left[2(e^x - 3)^{-1}\right]' =$

$= -2(e^x - 3)^{-2} \cdot e^x = \dfrac{-2e^x}{(e^x - 3)^2}$

VŽDY ZÁPORNÉ

VŽDY KLADNÉ

VŽDY ZÁPORNÉ

$(-\infty, \ln 3)$	$(\ln 3, \infty)$
$\searrow$	$\searrow$

$\Rightarrow$ NEMÁ LOK. EXTRÉMY