

TYŽDEN 7

1. Vypočítajte derivácie funkcie f , určte $D(f)$, $D(f')$
 - a. $f(x) = \ln x + 2 \sin x - x^3 + 2$ [$D(f) = D(f') = (0, \infty)$, $f' = \frac{1}{x} + 2 \cos x - 3x^2$]
 - b. $f(x) = \sqrt{x} - \sqrt[3]{x^4}$ [$D(f) = \langle 0, \infty \rangle$, $D(f') = (0, \infty)$, $f' = \frac{1}{2\sqrt{x}} - \frac{4}{3} \sqrt[3]{x}$]
 - c. $f(x) = \operatorname{tg} x - \operatorname{arccotg} x$ [$D(f) = \{x \in \mathbb{R}: x \neq (\pi/2) + k\pi \forall k \in \mathbb{Z}\} = D(f')$, $f' = \frac{1}{\cos^2 x} - \frac{1}{1+x^2}$]
 - d. $f(x) = 2e^x - \cos x + 3^x$ [$D(f) = D(f') = \mathbb{R}$, $f' = 2e^x + \sin x + 3^x \ln 3$]
 - e. $f(x) = \frac{x^2}{2x-1}$ [$D(f) = D(f') = \mathbb{R} \setminus \{1/2\}$, $f' = \frac{2x(x-1)}{(2x-1)^2}$]
 - f. $f(x) = (x^2 - 2x + 3)e^x$, $f'(1) = ?$ [$D(f) = D(f') = \mathbb{R}$, $f' = (x^2 + 1)e^x$, $f'(1) = 2e$]
 - g. $f(x) = \frac{(x-1)\ln x}{x^2+1}$, $f'(1) = ?$ [$D(f) = D(f') = (0, \infty)$, $f' = \frac{x-1+(x-2x^2-2x^4)\ln x}{x(x^2+1)}$, $f'(1) = 0$]
 - h. $f(x) = \arcsin(2x - 1)$, $f(1/2) = ?$, $f'(1/2) = ?$
 $[D(f) = \langle 0, 1 \rangle$, $D(f') = (0, 1)$, $f' = 1/\sqrt{x-x^2}$, $f(1/2) = 0$, $f'(1/2) = 2$]
 - i.* $f(x) = \left(1 + \frac{1}{x}\right)^x$, [$Df = (-\infty, -1) \cup (0, \infty)$, $D(f') = D(f) \setminus \{-1\}$, $f' = \left(1 + \frac{1}{x}\right)^x \left(\ln \frac{x+1}{x} - \frac{1}{x+1}\right)$]
2. Nájdite rovnicu dotyčnice ku grafu funkcie f v bode T .
 - a. $f(x) = e^{1-x^2}$, $T = (-1, ?)$ [$T = (-1, 1)$, $t \equiv y - 1 = 2(x + 1)$]
 - b. $f(x) = e^{1-x} \cos \pi x$, $T = (1, -1)$ [$t \equiv y = x - 2$]
3. Vypočítajte $f'(a)$ pre
 - a. $f(x) = |x + 2|$, $a = -2$, [$f'(-2) \notin \mathbb{R}$]
 - b. $a = 0$, $f(x) = \begin{cases} x^2 \sin \frac{1}{x}, & x \neq 1, \\ 0, & x = 0, \end{cases}$ [$f'(0) = 0$]