$x' = 1$, $a' = 0$

Derivácia funkcie

$(x^n)' = n \cdot x^{n-1}$ | $(\sin x)' = \cos x \cdot x'$ | $(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$

$(a^x)' = a^x \cdot \ln a$ | $(\cos x)' = -\sin x$ | $(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$

$(e^x)' = e^x \cdot x'$ | $(\mathrm{tg}\, x)' = \frac{1}{\cos^2 x}$ | $(\mathrm{arctg}\, x)' = \frac{1}{1+x^2}$

$(\log_a x)' = \frac{1}{x \ln a}$ | $(\mathrm{cotg}\, x)' = -\frac{1}{\sin^2 x} \cdot x'$ | $(\mathrm{arccotg}\, x)' = -\frac{1}{1+x^2}$

$(\ln x)' = \frac{1}{x} \cdot x'$

$[a \cdot f(x) \pm b \cdot g(x)]' = a \cdot f'(x) \pm b \cdot g'(x)$

$[f(x) \cdot g(x)]' = f'(x) \cdot g(x) + f(x) \cdot g'(x)$

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

Zderivujme:

1. $f(x) = 3x^5 - 7x^3 + 11x^2 - 7x + 35$ $\qquad \sqrt[n]{x^m} = x^{\frac{m}{n}}$
   $f'(x) = 3.5.x^4 - 7.3.x^2 + 11.2.x - 7 + 0$

2. $f(x) = \frac{1}{x^4} - 2\sqrt{x} + \sqrt[5]{x^3} - \frac{1}{x} = x^{-4} - 2x^{\frac{1}{2}} + x^{\frac{3}{5}} - x^{-1}$
   $f'(x) = -4x^{-5} - 2\frac{1}{2}x^{-\frac{1}{2}} + \frac{3}{5} \cdot x^{-\frac{2}{5}} + x^{-2}$

3. $f(x) = \frac{1}{\sqrt[4]{x^9}} - \frac{1}{\sqrt{x}} + \frac{7}{x^3} - \frac{1}{x^{10}} = x^{-\frac{9}{4}} - x^{-\frac{1}{2}} + 7x^{-3} - x^{-10}$
   $f'(x) = -\frac{9}{4}x^{-\frac{13}{4}} + \frac{1}{2}x^{-\frac{3}{2}} - 21x^{-4} + 10x^{-11}$

4. $f(x) = \sqrt[4]{x^9} + \sqrt{x} + 7x^3 - x^{10} = x^{\frac{9}{4}} + x^{\frac{1}{2}} + 7x^3 - x^{10}$ ← x^n
   $f'(x) = \frac{9}{4}x^{\frac{5}{4}} + \frac{1}{2}x^{-\frac{1}{2}} + 21x^2 - 10x^9$

5. $f(x) = 2^x + \left(\frac{1}{5}\right)^x + e^x - 3.\ln x + 7.\log_3 x - 2\log_{\frac{1}{4}} x$
   a^x, $a = \frac{1}{2}$, $a = \frac{1}{5}$, $\log_a x$
   $f'(x) = 2^x.\ln 2 + \left(\frac{1}{5}\right)^x.\ln\frac{1}{5} + e^x - 3\frac{1}{x} + 7\frac{1}{x \ln 3} - 2\frac{1}{x \ln \frac{1}{4}}$ $\quad a = 3$, $a = \frac{1}{4}$

6. $f(x) = 10^x . x^{10}$
   $f'(x) = 10^x.\ln 10 . x^{10} + 10^x . 10.x^9$

7. $f(x) = \sin x \cdot \cos x$
   $f'(x) = \cos x . \cos x + \sin x (-\sin x)$

8. $f(x) = (3x^4 - 10x^2 + 11) . 20^x$
   $f'(x) = (12x^3 - 20x) . 20^x + (3x^4 - 10x^2 + 10) . 20^x . \ln 20$

9. $f(x) = \frac{\mathrm{tg}\, x}{x^2 + 3x}$ $\qquad \frac{f}{g}$
   $f'(x) = \frac{\frac{1}{\cos^2 x} . (x^2+3x) - \mathrm{tg}\, x . (2x+3)}{(x^2+3x)^2}$

10. $f(x) = \frac{e^x}{\sin x}$ $\qquad f'(x) = \frac{e^x . \sin x - e^x . \cos x}{\sin^2 x}$

11. $f(x) = \frac{\ln x}{x}$ $\qquad f'(x) = \frac{\frac{1}{x} . x - \ln x . 1}{x^2}$

12. $f(x) = x^5 . \mathrm{cotg}\, x$
    $f'(x) = 5x^4 . \mathrm{cotg}\, x + x^5 . \left(-\frac{1}{\sin^2 x}\right)$

13. $f(x) = e^x . \arcsin x$
    $f'(x) = e^x . \arcsin x + e^x . \frac{1}{\sqrt{1-x^2}}$

14. $f(x) = x . \arccos x + \pi . \mathrm{arctg}\, x - \frac{x^2 + x}{\mathrm{arccotg}\, x}$ $\quad$ (π – KONŠT)
    $f'(x) = \arccos x + x\left(-\frac{1}{\sqrt{1-x^2}}\right) + \pi \frac{1}{1+x^2} - \frac{(2x+1).\mathrm{arccotg}\, x - (x^2+x).\left(-\frac{1}{1+x^2}\right)}{(\mathrm{arccotg}\, x)^2}$

Derivácia zloženej funkcie

$[f(g(x))]' = f'(g(x)) \cdot g'(x)$

15. $f(x) = (3x^2 + 11x - 7)^{15}$ $\qquad \boxed{x^{15}}$
    $f'(x) = 15(3x^2 + 11x - 7)^{14} . (6x + 11)$

16. $f(x) = 3^{\sin x}$ $\qquad \boxed{3^x}$
    $f'(x) = 3^{\sin x} \ln 3 . \cos x$

17. $f(x) = \cos(\ln x)$ $\qquad \boxed{\cos x}$
    $f'(x) = -\sin(\ln x) . \frac{1}{x}$

18. $f(x) = (\ln x)^3$
    $f'(x) = 3(\ln x)^2 . \frac{1}{x}$

19. $f(x) = \ln^3 x = (\ln x)^3$

20. $f(x) = \ln x^3 = \ln(x^3)$
    $f'(x) = \frac{1}{x^3} . 3x^2$

21. $f(x) = \mathrm{tg}(x . e^x)$
    $f'(x) = \frac{1}{\cos^2(x . e^x)} . [e^x + x . e^x]$

22. $f(x) = \log^5 x^3 = [\log(x^3)]^5$ $\quad$ (2. 3. 1.)
    $f'(x) = 5 . (\log x^3)^4 . \frac{1}{x^3 . \ln 10} \, 3x^2$

23. $f(x) = \ln(\ln(\ln(2x)))$ $\quad$ (1. 2. 3. 4.) $\qquad f'(x) = \frac{1}{\ln(\ln(2x))} . \frac{1}{\ln(2x)} . \frac{1}{2x} . 2$

24. $f(x) = \sqrt{\mathrm{cotg}\, x^2} = (\mathrm{cotg}\, x^2)^{\frac{1}{2}}$ $\quad$ (2. 3. 1.)
    $f'(x) = \frac{1}{2}(\mathrm{cotg}\, x^2)^{-\frac{1}{2}} . \left(\frac{-1}{\sin^2 x^2}\right) . 2x$

25. $f(x) = \mathrm{arctg} \frac{2x+5}{3x-4}$
    $f'(x) = \frac{1}{1 + \left(\frac{2x+5}{3x-4}\right)^2} . \frac{2.(3x-4) - (2x+5).3}{(3x-4)^2}$

26. $f(x) = \log_4(x^3 . \cos x)$
    $f'(x) = \frac{1}{x^3 . \cos x . \ln 4} . [3x^2 . \cos x + x^3(-\sin x)]$

27. $f(x) = \ln \frac{4x+1}{4x-1}$ $\qquad f'(x) = \frac{1}{\frac{4x+1}{4x-1}} . \frac{4(4x-1) - (4x+1).4}{(4x-1)^2}$

28. $f(x) = \frac{e^x . \ln x}{(3x+2)^4}$ $\qquad \frac{f}{g}$
    $(e^x . \ln x)' = f'$, $= g$, $= f$, $= [(3x+2)^4]' = g'$, g^2
    $f'(x) = \frac{(e^x \ln x + e^x \frac{1}{x}) . (3x+2)^4 - e^x \ln x . 4(3x+2)^3 . 3}{(3x+2)^8}$ $\quad$ (5)

29. $f(x) = \sin^4(\mathrm{arctg}\sqrt{x})^3 = \left(\sin(\mathrm{arctg}\sqrt{x})^3\right)^4$ $\quad$ (2. 4. 5. 3. 1.) $\quad x^{\frac{1}{2}}$
    $f'(x) = 4.\left(\sin(\mathrm{arctg}\sqrt{x})^3\right)^3 . \cos(\mathrm{arctg}\sqrt{x})^3 . 3(\mathrm{arctg}\sqrt{x})^2 .$
    $. \frac{1}{1+(\sqrt{x})^2} . \frac{1}{2}x^{-\frac{1}{2}}$

30. $f(x) = \frac{\ln(2^x - x^7)}{(\cos x)^3}$
    $f(x) = \frac{\frac{1}{2^x - x^7} . (2^x \ln 2 - 7x^6) . (\cos x)^3 - \ln(2^x - x^7) . 3(\cos x)^2 . (-\sin x)}{(\cos x)^6}$ $\quad$ 4

Derivácia vyšších rádov

$f(x) = 3x^4 - 2x^3 + 7x^2 - 11x + 10$
$f'(x) = 12x^3 - 6x^2 + 14x - 11$
$f''(x) = (f'(x))' = 36x^2 - 12x + 14$
$f'''(x) = 72x - 12$

$f(x) = \sin x$
$f'(x) = \cos x$
$f''(x) = -\sin x$
$f'''(x) = -\cos x$
$f^{IV}(x) = \sin x$

$[f(x)]^{\text{konšt.}}$

$(\text{konšt.})^{f(x)}$ $\qquad \ln a^b = b \ln a$

$[f(x)]^{g(x)} = e^{\ln [f(x)]^{g(x)}} = e^{g(x) . \ln f(x)}$ $\quad (\text{konšt})^{f(x)}$

$f(x) = x^{\sin x} = e^{\sin x . \ln x}$
$f'(x) = e^{\sin x \ln x}\left[\cos x . \ln x + \sin x . \frac{1}{x}\right]$