## Kalkulus I. (fizika tanári képzés) deriválás gyakorló feladatok megoldás

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

(2) $$\left(\sqrt{\ln(\cos(x+1))}\right)' = \frac{1}{2}\left(\ln(\cos(x+1))\right)^{-\frac{1}{2}} \frac{1}{\cos(x+1)}(-\sin(x+1)) = \frac{-\operatorname{tg}(x+1)}{2\sqrt{\ln(\cos(x+1))}}$$

(3) $$\left((1-x)\operatorname{arc\,tg}(x^2)\right)' = -\operatorname{arc\,tg}(x^2) + (1-x)\frac{1}{1+(x^2)^2}2x$$

(4) $$\left(\operatorname{arc\,tg}\left(\frac{1}{x}\right)\right)' = \frac{1}{1+\left(\frac{1}{x}\right)^2}(-1)x^{-2} = \frac{-1}{x^2+1}$$

(5) $$\left(\sqrt[3]{\sqrt{x^3}\sqrt{x}}\right)' = \left(\sqrt[3]{x^2}\right)' = \frac{2}{3}x^{-\frac{1}{3}} = \frac{2}{3\sqrt[3]{x}}$$

(6) $$\left(x^3 e^{\sin(3x)}\right)' = 3x^2 e^{\sin(3x)} + x^3 e^{\sin(3x)} 3\cos(3x)$$

(7) $$\left(\sqrt[4]{\ln(x+2)+4\cos\left(\frac{x}{2}\right)}\right)' = \tfrac{1}{4}\left(\ln(x+2)+4\cos\left(\tfrac{x}{2}\right)\right)^{-\frac{3}{4}}\left(\tfrac{1}{x+2} + 4\cdot\tfrac{1}{2}\left(-\sin\left(\tfrac{x}{2}\right)\right)\right)$$

(8) $$\left(\ln\left(\frac{x}{3}\right)^2\right)' = \left(\ln\left(\left(\frac{x}{3}\right)^2\right)\right)'\left(2\ln\left(\frac{x}{3}\right)\right)' = \frac{2}{x}$$

(9) $$\left(\ln^2\left(\frac{x}{3}\right)\right)' = \left(\left(\ln\left(\frac{x}{3}\right)\right)^2\right)' = 2\ln\left(\frac{x}{3}\right)\frac{1}{x}$$

(10) $$\left(\frac{1}{\sqrt{x}e^{-x^2}}\right)' = \left(x^{-\frac{1}{2}}e^{x^2}\right)' = -\frac{1}{2}x^{-\frac{3}{2}}e^{x^2} + x^{-\frac{1}{2}}e^{x^2}2x$$