Derivare

$$\frac{d}{dx}\frac{1}{x} = -\frac{1}{x^2}$$

$$\frac{d}{dx}x^n = n\cdot x^{n-1}$$

$\boxed{\alpha}$

$$\frac{d}{dx}\left(2x^3 - 5x^2 + \frac{3}{x}\right)$$

$$= \frac{d}{dx}\left(2x^3 - 5x^2 + 3x^{-1}\right)$$

$$= 2\cdot 3x^2 - 5\cdot 2\cdot x^1 + 3(-1)\cdot x^{-2}$$

$$= 6x^2 - 10x - \frac{3}{x^2}$$

$\boxed{\beta}$

$$\frac{d}{dx}x^3(x^2-1)^2 = \frac{d}{dx}x^3(x^4 - 2x^2 + 1)$$

$$= \frac{d}{dx}\left(x^7 - 2x^5 + x^3\right) = 7x^6 - 2\cdot 5x^4 + 3x^2$$

$$= x^2(7x^4 - 10x^2 + 3)$$

$\boxed{\gamma}$

$$\frac{d}{dx}\frac{x}{1-x^2} = \frac{1(1-x^2) - x(-2x)}{(1-x^2)^2}$$

$$\frac{d}{dx}\frac{f(x)}{g(x)} = \frac{f'(x)\cdot g(x) - f(x)g'(x)}{(g(x))^2}$$

$$= \frac{1 - x^2 + 2x^2}{(1-x^2)^2} = \frac{1+x^2}{(1-x^2)^2}$$

$\boxed{\delta}$

$$\frac{d}{dx}\frac{3x+1}{x^5} = \frac{d}{dx}\left(\frac{3\cancel{x}^{1}}{x^{\cancel{5}4}} + \frac{1}{x^5}\right) = \frac{d}{dx}\left(3\cdot x^{-4} + x^{-5}\right)$$

$$= 3(-4)\cdot x^{-5} + (-5)x^{-6} = -\frac{12}{x^5} - \frac{5}{x^6} = -\left(\frac{12x}{x^6} + \frac{5}{x^6}\right)$$

$$= -\frac{12x+5}{x^6}$$

$\boxed{\varepsilon}$ ϵ

$$\frac{d}{dx}\sqrt[3]{x} = \frac{d}{dx}x^{1/3} = \frac{1}{3}x^{\frac{1}{3}-1} = \underline{\frac{1}{3}x^{-2/3}} = \underline{\frac{1}{3\cdot x^{2/3}}} = \frac{1}{3(x^2)^{1/3}} = \underline{\frac{1}{3\sqrt[3]{x^2}}}$$

$\boxed{\xi}$

$$\frac{d}{dx}\sqrt{x\sqrt{x\sqrt{x}}} = \frac{d}{dx}\left(x\left(x\cdot x^{1/2}\right)^{1/2}\right)^{1/2} = \frac{d}{dx}\left(x\cdot\left(x^{3/2}\right)^{1/2}\right)^{1/2}$$

$a^b\cdot a^c = a^{b+c}$

$(a^b)^c = a^{b\cdot c}$

$$= \frac{d}{dx}\left(x\cdot x^{3/4}\right)^{1/2} = \frac{d}{dx}\left(x^{7/4}\right)^{1/2} = \frac{d}{dx}x^{7/8} = \frac{7}{8}x^{\frac{7}{8}-1}$$

$$= \frac{7}{8}x^{-\frac{1}{8}} = \frac{7}{8\cdot x^{1/8}} = \frac{7}{8\sqrt[8]{x}}$$

$\boxed{\eta}$

$\frac{d}{dx}f(x)\cdot g(x) = f'(x)\cdot g(x) + f(x)\cdot g'(x)$

$$\frac{d}{dx}e^x(x^2+2x-2) = e^x(x^2+2x-2) + e^x(2x+2)$$

$$= e^x(x^2+2x-2+2x+2) = e^x(x^2+4x)$$

$\boxed{\vartheta}$

θ

$$\frac{d}{dx}x\cos x = 1\cdot\cos x + x(-\sin x) = \cos x - x\cdot\sin x$$

$\boxed{\iota}$

$$\frac{d}{dx}(x\cdot\ln x - x) = 1\cdot\ln x + x\cdot\frac{1}{x} - 1 = \ln x + 1 - 1 = \ln x$$

$\boxed{\kappa}$

$$\frac{d}{dx}\frac{1}{\ln x} = \frac{d}{dx}(\ln x)^{-1} = (-1)(\ln x)^{-2}\cdot\underbrace{\frac{1}{x}}_{\frac{d}{dx}\ln x} = -\frac{1}{(\ln x)^2\cdot x}$$

$\boxed{\lambda}$

$$\frac{d}{dx}(ax+b)^n = n(ax+b)^{n-1}\cdot a = a\cdot n\cdot(ax+b)^{n-1}$$

$\boxed{\mu}$

$$\frac{d}{dx}\sin^3 x = \frac{d}{dx}(\sin x)^3 = 3(\sin x)^2\cdot\cos x$$

$\boxed{\nu}$

$$\frac{d}{dx}\sin(3x) = \cos(3x)\cdot 3 = 3\cdot\cos(3x)$$

$\boxed{\xi}$

ξ

$$\frac{d}{dx}\ln(\sin x) = \frac{1}{\sin x}\cdot\cos x = \frac{\cos x}{\sin x} = \cot x = \frac{1}{\tan x}$$

0

$$\frac{d}{dx}\frac{1}{(1+x^2)\sqrt{1+x^2}} = \frac{d}{dx}\frac{1}{(1+x^2)(1+x^2)^{1/2}}$$

$a^b\cdot a^c = a^{b+c}$

$$= \frac{d}{dx}\frac{1}{(1+x^2)^{3/2}} = \frac{d}{dx}(1+x^2)^{-3/2} = -\frac{3}{\cancel{2}}(1+x^2)^{-5/2}\cdot\cancel{2}x = -\frac{3\cdot x}{(1+x^2)^{5/2}}$$

π

$$\frac{d}{dx}\sqrt{x+\sqrt{x}} = \frac{1}{2\sqrt{x+\sqrt{x}}}\cdot\left(1+\frac{1}{2\sqrt{x}}\right)$$

$\frac{d}{dx}\sqrt{x} = \frac{1}{2\sqrt{x}}$

$$= \frac{1}{2\sqrt{x+\sqrt{x}}}\cdot\frac{2\sqrt{x}+1}{2\sqrt{x}} = \frac{2\sqrt{x}+1}{4\sqrt{(x+\sqrt{x})x}}$$

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e
p

$$\frac{d}{dx}\ln\frac{1-x}{1+x} = \frac{d}{dx}\left(\ln(1-x)-\ln(1+x)\right)$$

$\ln\frac{a}{b} = \ln a - \ln b$

$$= \frac{1}{1-x}\cdot(-1) - \frac{1}{1+x}\cdot 1 = -\left(\frac{1}{1-x}+\frac{1}{1+x}\right) = -\frac{1+\cancel{x}+1-\cancel{x}}{(1-x)(1+x)}$$

$$= -\frac{2}{1-x^2} = \frac{2}{x^2-1}$$

$$\frac{d}{dx}\tan x = \frac{1}{\cos^2 x} = 1+\tan^2 x$$

σ

$$\frac{d}{dx}\ln\left(\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)\right) = \frac{1}{\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)}\cdot\frac{1}{\cos^2\left(\frac{x}{2}+\frac{\pi}{4}\right)}\cdot\frac{1}{2}$$

$\sin 2x = 2\sin x\cos x$

$$= \frac{1}{2\,\frac{\sin\left(\frac{x}{2}+\frac{\pi}{4}\right)}{\cancel{\cos\left(\frac{x}{2}+\frac{\pi}{4}\right)}}\cdot\cos^{\cancel{2}\,1}\left(\frac{x}{2}+\frac{\pi}{4}\right)} = \frac{1}{2\sin\left(\frac{x}{2}+\frac{\pi}{4}\right)\cdot\cos\left(\frac{x}{2}+\frac{\pi}{4}\right)}$$

$$= \frac{1}{\sin\left(2\cdot\left(\frac{x}{2}+\frac{\pi}{4}\right)\right)} = \frac{1}{\sin\left(x+\frac{\pi}{2}\right)} = \frac{1}{\sin x\cdot\underbrace{\cos\frac{\pi}{2}}_{=0}+\cos x\cdot\underbrace{\sin\frac{\pi}{2}}_{=1}}$$

$$= \frac{1}{\cos x}$$

τ

$$\frac{d}{dx}\arctan x = \frac{1}{1+x^2}$$

$$\frac{d}{dx}\frac{1}{a}\arctan\frac{x}{a} = \frac{1}{a}\cdot\frac{1}{1+\left(\frac{x}{a}\right)^2}\cdot\frac{1}{a} = \frac{1}{a^2\left(1+\frac{x^2}{a^2}\right)} = \frac{1}{a^2+x^2}$$

$\boxed{\upsilon}$

$$\frac{d}{dx}\sqrt{2}^{\sqrt{1+x^2}} = \frac{d}{dx} e^{\ln\sqrt{2}^{\sqrt{1+x^2}}} = \frac{d}{dx} e^{\sqrt{1+x^2}\cdot\ln\sqrt{2}}$$

$$= \underbrace{e^{\sqrt{1+x^2}\cdot\ln\sqrt{2}}}_{\sqrt{2}^{\sqrt{1+x^2}}}\cdot\ln\overbrace{\sqrt{2}}^{2^{\frac{1}{2}}}\cdot\frac{1}{\cancel{2}\sqrt{1+x^2}}\,\cancel{2}x = \sqrt{2}^{\sqrt{1+x^2}}\cdot\frac{1}{2}\ln 2\,\frac{x}{\sqrt{1+x^2}}$$

$$= \sqrt{2}^{\sqrt{1+x^2}}\,\frac{x\cdot\ln 2}{2\sqrt{1+x^2}}$$

$\boxed{\varphi}$

$$\frac{d}{dx} e^{x\cdot\ln x} = e^{x\cdot\ln x}\cdot\left(1\cdot\ln x + x\cdot\frac{1}{x}\right) = e^{x\cdot\ln x}\cdot(\ln x+1)$$

$\boxed{\chi}$

$$\frac{d}{dx} x^{x} = \frac{d}{dx} e^{\ln x^{x}} = \frac{d}{dx} e^{x\cdot\ln x} \overset{\varphi}{=} \underbrace{e^{x\cdot\ln x}}_{=x^{x}}(\ln x+1)$$

$$= x^{x}(\ln x+1)$$

$\boxed{\psi}$

$$\frac{d}{dx} x^{\sin x} = \frac{d}{dx} e^{\ln x^{\sin x}} = \frac{d}{dx} e^{\sin x\cdot\ln x}$$

$$= \underbrace{e^{\sin x\cdot\ln x}}_{x^{\sin x}}\left(\cos x\cdot\ln x + \sin x\cdot\frac{1}{x}\right) = x^{\sin x}\left(\cos x\cdot\ln x + \frac{\sin x}{x}\right)$$

$\boxed{\omega}$

$$\frac{d}{dx}(x^3+x)^{\arctan x} = \frac{d}{dx} e^{\ln(x^3+x)^{\arctan x}} = \frac{d}{dx} e^{\arctan x\cdot\ln(x^3+x)}$$

$$= \underbrace{e^{\arctan x\cdot\ln(x^3+x)}}_{(x^3+x)^{\arctan x}}\left(\frac{1}{1+x^2}\cdot\ln(x^3+x) + \arctan x\cdot\frac{1}{\underbrace{x^3+x}_{x(x^2+1)}}(3x^2+1)\right)$$

$$= (x^3+x)^{\arctan x}\,\frac{x\cdot\ln(x^3+x)+(3x^2+1)\arctan x}{x(x^2+1)}$$