343 $f(x) = \underbrace{(x^2-1)^2}_{f}\underbrace{(x+1)^3}_{g}$ $\quad (f \cdot g)' = f' \cdot g + f \cdot g'$

$$f'(x) = \underbrace{[(x^2-1) \cdot 2x]}_{f'} \cdot \underbrace{[(x+1)^3]}_{g}$$

$$+ \underbrace{(x^2-1)^2}_{f} \cdot \underbrace{3(x+1)^{2} \cdot 1}_{g'}$$

$$= 2x(x^2-1) \cdot (x+1)^3 + (x^2-1)^2 \, 3(x+1)^2$$

$$= (x+1)^2(x^2-1)[2x(x+1) + 3(x^2-1)]$$

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366 $f(x) = \underbrace{2x}_{f}\underbrace{\cos x}_{g} + \underbrace{(x^2-2)}_{f}\underbrace{\sin x}_{g}$

$$\frac{d}{dx}(2x\cos(x)) = \underbrace{2}_{f'} \cdot \underbrace{\cos(x)}_{g} + \underbrace{2x}_{f}\underbrace{(-\sin(x))}_{g'}$$

$$\frac{d}{dx}(x^2-2)(\sin(x)) = \underbrace{2x}_{f'} \cdot \underbrace{\sin(x)}_{g} + \underbrace{(x^2-2)}_{f} \cdot \underbrace{\cos(x)}_{g'}$$

$$= 2\cos(x) - \cancel{2x\sin(x)} + \cancel{2x\sin(x)} + (x^2-2)\cos(x)$$

$$= \cos(x)[2 + (x^2-2)]$$

389 $f(x) = \dfrac{(x^2-1)}{((x+1)^3)} \quad$ (f / g) $=$

$$= \frac{\underbrace{2x}_{f'} \cdot \underbrace{(x+1)^3}_{g} - \underbrace{(x^2-1)}_{f} \cdot \underbrace{3(x+1)^2 \cdot 1}_{g'}}{(x+1)^6}$$

$$= \frac{\cancel{(x+1)^2}[2x - 3(x^2-1)]}{(x+1)^{\cancel{6}\,4}}$$

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

$$\frac{\cancel{(x+1)}^1(3-x)}{(x+1)^{\cancel{4}\,3}} = \frac{(3-x)}{(x+1)^3}$$

351 $f(x) = e^{2x} + \sqrt[3]{e^x}$

5xP

$$f'(x) = e^{2x} \cdot 2 + \underline{(e^x)^{1/3}}$$

POTENZA

$$= e^{2x} \cdot 2 + \frac{1}{3}(e^x)^{-2/3} \cdot e^x$$

$$= 2e^{2x} + \frac{1}{3} e^{\frac{1}{3}x}$$

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

QUOZIENTE

371 $f(x) = \underbrace{\ln}_{\text{LOGARITMO}}\left(\frac{x^2-2x}{x+1}\right)$

$$\frac{d}{dx}\left(\frac{x^2-2x}{x+1}\right) = \frac{\overset{f'}{(2x-2)}\overset{g}{(x+1)} - \underset{f}{x^2-2x}\cdot\underset{g'}{1}}{(x+1)^2}$$

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

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

$x^2-2x \rightarrow x(x-2)$

371 $f(x) = \ln\left(\frac{x^2-2x}{x+1}\right)$

$$\ln(f(x)) = \frac{1}{f(x)}$$

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

384 $f(x) = \frac{(x\ln x + x^2\ln^3 x)\ f'}{(x^2\ln x)\ g'}$

$$\frac{d}{dx}[x\ln(x)] = \underset{f'}{1}\cdot\underset{g}{\ln(x)} + \underset{f}{\cancel{x}}\cdot\underset{g'}{\frac{1}{\cancel{x}}} = \ln(x)+1$$

$$\frac{d}{dx}[x^2\ln^3(x)] = \underbrace{2x}_{f'}\,\underbrace{\ln^3(x)}_{g} + \underbrace{\cancel{x^2}}_{f}\cdot\underbrace{\frac{3\ln^2(x)}{\cancel{x}}}_{g'}$$

$\ln^3(x)$ COMPOSTA

$3\ln^2(x)\cdot\frac{1}{x}$

$$\frac{d}{dx}[x^2\ln(x)]$$

$$= \underbrace{2x}_{f'}\cdot\underbrace{\ln(x)}_{g} + \underbrace{\cancel{x^2}}_{f}\cdot\underbrace{\cancel{\frac{1}{x}}}_{g'}$$

$$= 2x\ln(x) + x$$

384 $f(x) = \dfrac{\overbrace{(x\ln x + x^2\ln^3 x)}^{f}}{\underbrace{(x^2\ln x)}_{g}} = \dfrac{f'g - fg'}{(g)^2}$

$$= \frac{\underbrace{2x\ln^3(x) + 3x\ln^2(x) + (2x\ln(x) + x)}_{f'}\cdot\underbrace{x^2\ln(x)}_{g} - \underbrace{[2x\ln(x) + x]}_{g'}\cdot\underbrace{(x\ln(x) + x^2\ln^3(x))}_{f}}{\underbrace{x^4\ln^2(x)}_{g^2}}$$

$$= \frac{[2x\ln(x) + x]\,[[2x\ln^3(x) + 3x\ln^2(x)]\cdot x^2\ln(x)) + [(x\ln(x) + x^2\ln^3(x)]}{x^4\ln^2(x)}$$

395 $f(x) = \sin(\sqrt{1+\ln x})$

$0 + \frac{1}{x} = f'(x)$ $\quad [1+\ln(x)]^{1/2}$

$$f'(x) = \cos\sqrt{1+\ln(x)} \cdot \frac{1}{2}[1+\ln(x)]^{-1/2} \cdot \frac{1}{x}$$

397 $f(x) = (x^2+1)(x^2+2)^2(x^2+3)$ $\quad 1°$ $\quad 2°$

$$\frac{d}{dx}\left[\underbrace{(x^2+1)}_{f'}\underbrace{(x^2+2)^2}_{g}\right] = f' \cdot g + f \cdot g'$$

$$= \underbrace{2x}_{f'} \cdot \underbrace{(x^2+2)^2}_{g} + \underbrace{(x^2+1) \cdot 4x}_{g'} \quad \underbrace{(x^2+1)}_{f}$$

$$= 2x(x^2+2)^2 + (x^2+1)[4x+1]$$

$$\frac{d}{dx}\left[\underbrace{(x^2+2)^2}_{f'}\underbrace{(x^2+3)}_{g}\right] = \underbrace{(x^2+2) \cdot 4x}_{f'} \cdot \underbrace{(x^2+3)}_{g}$$

$$+ \underbrace{(x^2+2)^2}_{f} \cdot \underbrace{2x}_{g'} = (x^2+2)2x[2(x^2+3) + (x^2+2)]$$

$$2x(x^2+2)^2 + \underbrace{(x^2+1)[4x+1]}_{\text{PROB.}} \to f$$

$$\underbrace{(x^2+2)2x}_{f}\,[\underbrace{2(x^2+3) + (x^2+2)}_{g}] \to g$$

$$f' = 2(x^2+2)\cdot 2x + \underbrace{[2x[4x+1] + 4(x^2+1)]}_{\text{prod}}$$

$$g' = \underbrace{6x^2+2}_{f'}(x^2+2)[2(x^2+3)\underbrace{+(x^2+2)}_{g}]$$

$$\underbrace{+6x}_{g'} + \underbrace{(x^2+2x)}_{f}$$

$$\underbrace{\{2(x^2+2)\cdot 2x + [2x[4x+1] + 4(x^2+1)]\}}_{f'}$$

$$\underbrace{\cdot\,(x^2+2)2x[2(x^2+3)+(x^2+2)]}_{g} +$$

$$\underbrace{2x(x^2+2)^2 + (x^2+1)[4x+1]}_{f} \quad +$$

$$\underbrace{6x^2+2}_{f'}(x^2+2)[2(x^2+3)\underbrace{+(x^2+2)}_{g}]$$

$$\underbrace{+6x}_{g'} + \underbrace{(x^2+2x)}_{f}$$

350 $f(x) = \sqrt[3]{x^2(x-1)}$ $\rightarrow [x^2(x-1)]^{1/3}$

$$\frac{d}{dx}[\underbrace{x^2}_{f}\underbrace{(x-1)}_{g}] = \underbrace{2x}_{f'}\underbrace{(x-1)}_{g} + \underbrace{x^2}_{f}\cdot\underbrace{1}_{g'}$$

$$= 2x^2 - 2x + x^2 = 3x^2 - 2x$$

$$= x(3x-2)$$

$$\frac{1}{3}(x^2(x-1))^{-2/3} \cdot x(3x-2)$$

$$\frac{1}{3}\sqrt[3]{\frac{1}{[(x^2(x-1)]^2}}\,[x(3x-2)]$$

Trova l'equazione della retta tangente al grafico della funzione $f(x) = \frac{x^2-4}{x-2}$ nel punto di ascissa $x = 3.$ $f(3)$

$$f(x) = \frac{x^2-4}{x-2} \rightarrow f(3) = \frac{3^2-4}{3-2} = \frac{9-4}{1} = 5$$

$$f'(x) = \frac{2x(x-2) - (x^2-4)}{(x-2)^2} =$$

$$\frac{2x^2-4x-x^2-4}{(x-2)^2} = \frac{x^2-4x-4}{(x-2)^2} = \frac{\cancel{(x-2)^2}}{\cancel{(x-2)^2}}$$

$$= 1$$

$(x - x_0)$

RETTA TANGENTE A $x_0 = 3$ $\rightarrow y - 5 = \underbrace{1}_{f'(x)} \cdot (x-3)\,y$

$\boxed{y = x+2}$