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a)

$$f'(x) = \frac{1}{3x^{26/27}} + 200x^{99} - 12x^3 - 70x^9 + \frac{5}{12x^{13/12}}$$

b)

$$f'(x) = 4e^x x^6(7+x) + 3x^4(1+5 \ln x) - 11x^2(-3 \cos x + x \sin x) - 5x^3(x \cos x + 4 \sin x) - \frac{22}{x^{12}}$$

c)

$$f'(x) = \frac{e^{-x}(-8 - 29x + 5x^2 + 7x^3 + 3x^5 - 3x^6)}{x^5}$$

d)

$$f'(x) = x^3(18+7x^4)(-7x^8+9x^5+9+\ln x) + (-2+6x^3+x^7)(1-63x^8+540x^5+9+\ln x)$$

e)

$$f'(x) = 2 \sec^2(x) - 3 \csc^2(x) - 6 \sec(x) \tan(x) - \cot(x) \csc(x)$$

f)

$$f'(x) = (-x + 11x^4 - 10x^5 + 12x^6) \left(2e^x \cos(x) - 3 \cos(x) \log(x) - 2e^x \sin(x) - 3 \frac{\sin(x)}{x} \right) + (-1 + 44x^3 - 50x^4 + 72x^5)(2e^x \cos(x) - 3 \log(x) \sin(x))$$

g)

$$f'(x) = -\frac{21}{x^8} + \frac{1}{4x^{2/5}} + \frac{1}{7x^{2/7}} + \frac{(e^x(2-3x+x^2))}{x} + e^x(-3+2x) \ln x + e^x(2-3x+x^2) \ln x$$

h)

$$f'(x) = \frac{1 - 14x + 7x^2}{(x-1)^2}$$

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a) $f'(p) = 0$; b) $f'(p) = 0$

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c) Não é derivável em $p = 2$

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c) Não é derivável em $p = 1$

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$f'(x) = 2x$, $f''(x) = 2$ e $f'''(x) = 0$

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a)

$$f'(x) = 9 \left(\frac{2}{3x^{2/3}} - 18x^5 \right) (2\sqrt[3]{x} - 3x^6)^8 - 7 (x \sin(x^2) + \cos^3(x))^6 (\sin(x^2) + 2x^2 \cos(x^2) - 3 \sin(x) \cos^2(x))$$

b)

$$f'(x) = 200 (40x^{19} + 63x^8 - 33x^2) (2x^{20} + 7x^9 - 11x^3)^{199} + e^{x^{33}} x(2 + 33x^{33}) + \frac{(12x^4 \ln^2(x^4 - 1))}{(x^4 - 1)} + \ln^3(x^4 - 1)$$

c)

$$f'(x) = \frac{(7 \cos^6(x^2)(e^{x^6} + 6e^{x^6} x^6 + 5 \frac{\ln^4(x)}{x}))}{(e^{x^6} x + \ln^5(x))^2} + \frac{84x \cos^5(x^2) \sin(x^2)}{e^{x^6} x + \ln^5(x)}$$

d)

$$f'(x) = -\frac{9}{x^{13}} + 7 \sin(x^4 - 9x^2 - x - 1) + 7x(4x^3 - 18x - 1) \cos(x^4 - 9x^2 - x - 1) + 9e^{-3-3x-3x^2-5x^4+x^6} (-3 - 6x - 20x^3 + 6x^5) + \frac{(-7 + 2x)}{(-3 - 7x + x^2)}$$

e)

$$f'(x) = e^{-\frac{1+x}{1+x^2}} \frac{(1-x+4x^2+x^3+x^4)}{(1+x^2)^2} + \frac{x^2(36-100x^2-14x^4+120x^5+20x^7+20x^9-42x^{10}+3x^{14})}{(2-6x^3+x^7)(2-10x^5+x^{10})}$$

f)

$$f'(x) = \frac{4(1-4x+9x^2)\ln^3(1+x-2x^2+3x^3)}{1+x-2x^2+3x^3} - 7(-2+18x-15x^2+8x^3)\cos^6(10-2x+9x^2-5x^3+2x^4)\sin(10-2x+9x^2-5x^3+2x^4)$$