RESOLUÇÃO

① a) $\dfrac{\overbrace{x}^{f}}{\underbrace{x^2+1}_{g}}$

$f' = 1 \quad$ e $\quad g' = 2x$

$$y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

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

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

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

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

$f' = 2x \quad e \quad g' = 1$

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

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

$$\boxed{y' = \frac{x^2 + 2x + 1}{(x+1)^2}}$$

c) $\dfrac{\overbrace{3x^2+3}^{f}}{\underbrace{5x-3}_{g}}$

$f' = 6x \quad \text{e} \quad g' = 5$

$$y' = \frac{6x \cdot (5x-3) - (3x^2+3) \cdot 5}{(5x-3)^2}$$

$$y' = \frac{30x^2 - 18x - 15x^2 - 15}{5x-3)^2}$$

$$\boxed{y' = \frac{15x^2 - 18x - 15}{(5x-3)^2}}$$

d) $\frac{\sqrt{x}}{x+1}$ $\quad f = x^{\frac{1}{2}}$

$f' = \frac{1}{2} x^{-\frac{1}{2}} = \frac{1}{2} \cdot \frac{1}{x^{\frac{1}{2}}} = \frac{1}{2\sqrt{x}}$

$g' = 1$

$$y' = \frac{\frac{1}{2\sqrt{x}} \cdot (x+1) - \sqrt{x} \cdot 1}{(x+1)^2}$$

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

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

$$y' = \frac{\frac{1-x}{2\sqrt{x}}}{(x+1)^2} \Rightarrow \boxed{y' = \frac{1-x}{2\sqrt{x}(x+1)^2}}$$

e) $5x + \underbrace{\frac{x}{x-1}}_{g}$ f $\quad f' = 1 \quad$ e $\quad g' = 1$

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$$y' = 5 + \frac{1\,(x-1) - x\,1}{(x-1)^2}$$

$$y' = 5 + \frac{x - 1 - x}{(x-1)^2}$$

$$y' = 5 + \frac{-1}{(x-1)^2}$$

$$\boxed{y' = 5 - \frac{1}{(x-1)^2}}$$

f) $\sqrt{x} + \frac{3}{x^3+2}$

$\hookrightarrow x^{1/2}$

$f' = 0$ e $g' = 3x^2$

$$y' = \frac{1}{2}x^{-1/2} + \frac{0\cdot(x^3+2) - 3(3x^2)}{(x^3+2)^2}$$

$$y' = \frac{1}{2}\cdot\frac{1}{x^{1/2}} + \frac{-9x^2}{(x^3+2)^2}$$

$$\boxed{y' = \frac{1}{2\sqrt{x}} - \frac{9}{(x^3+2)^2}}$$