

The
Product
Rule
&
Quotient
Rule

3.2 Pg. 181 (1, 5, 6, 17, 21, 27)

$$\begin{aligned} 1. \quad f(x) &= 2x(x^2+1) \\ f'(x) &= 2x(2x) + (x^2+1)(2) \\ &= 4x^2 + 2x^2 + 2 \\ &= \boxed{6x^2 + 2} \end{aligned}$$

$$\begin{aligned} 5. \quad f(x) &= (3x+1)(x^2-2) \\ f'(x) &= (3x+1)(2x) + (x^2-2)(3) \\ &= 6x^2 + 2x + 3x^2 - 6 \\ &= \boxed{9x^2 + 2x - 6} \end{aligned}$$

$$\begin{aligned} 6. \quad f(x) &= (x+1)(2x^2-3x+1) \\ f'(x) &= (x+1)(4x-3) + (2x^2-3x+1)(1) \\ &= 4x^2 - 3x + 4x - 3 + 2x^2 - 3x + 1 \\ &= \boxed{6x^2 - 2x - 2} \text{ OR } 2(3x^2 - x - 1) \end{aligned}$$

$$17. \quad f(x) = \frac{2x-1}{2x+1}$$

$$f'(x) = \frac{(2x+1)(2) - (2x-1)(2)}{(2x+1)^2} = \frac{4x+2 - 4x+2}{(2x+1)^2}$$

$$\boxed{f'(x) = \frac{4}{(2x+1)^2}}$$

$$21. \quad f(s) = \frac{s^2-4}{s+1}; \quad f'(s) = \frac{(s+1)(2s) - (s^2-4)(1)}{(s+1)^2}$$

$$= \frac{(2s^2+2s - s^2+4)}{(s+1)^2}$$

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$$= \boxed{\frac{(s^2+2s+4)}{(s+1)^2}}$$

(Cont.) 3.2 (27)

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

$$f'(x) = \frac{(x-2) \left[(x+1)(2x) + (x^2+1)(1) \right] - (x+1)(x^2+1)(1)}{(x-2)^2}$$

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

$$f'(x) = \frac{(x^2-x-2)(2x) + x^3+x-2x^2-2 - (x^3+x+x^2+1)}{(x-2)^2}$$

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

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

Yes, I did it!