Worksheet - Combining Differentiation Rules

Differentiate using a combination of derivative rules

1. $h(x) = (x^2+3)^4(4x-5)^3$
2. $g(x) = \left(\dfrac{1+x^2}{1-x^2}\right)^{10}$
3. $f(x) = (x+4)^3(x-3)^6$
4. $y = (x^2+3)^3(x^3+3)^2$
5. $y = \dfrac{3x^2+2x}{x^2+1}$
6. $h(x) = x^3(3x-5)^2$
7. $y = x^4(1-4x^2)^3$
8. $y = \left(\dfrac{x^2-3}{x^2+3}\right)^4$
9. $y = x^4(2x-5)^6$
10. $y = x\sqrt{x^2+1}$
11. $y = \dfrac{(2x-5)^4}{(x+1)^3}$
12. $y = \left(\dfrac{10x-1}{3x+5}\right)^6$
13. $y = (x-2)^3(x^2+9)^4$
14. $y = (1-x^2)^3(6+2x)^{-3}$
15. $y = \dfrac{6x-1}{(3x+5)^4}$
16. $y = \dfrac{(2x^2-5)^3}{(x+8)^2}$
17. $f(x) = \dfrac{-3x^4}{\sqrt{4x-8}}$
18. $g(x) = \left(\dfrac{2x+5}{6-x^2}\right)^4$
19. $y = \left[\dfrac{1}{(4x+x^2)^3}\right]^3$

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Answers

1. $h'(x) = 4(x^2+3)^3(4x-5)^2(11x^2-10x+9)$ 2. $g'(x) = \dfrac{40x(1+x^2)^9}{(1-x^2)^{11}}$

3. $f'(x) = (x+4)^2(x-3)^5(9x+15)$ 4. $y' = 6x(x^2+3)^2(x^3+3)(2x^3+3x+3)$ 5. $y' = \dfrac{-2(x^2-3x-1)}{(x^2+1)^2}$

6. $h'(x) = 15x^2(3x-5)(x-1)$ 7. $y' = 4x^3(1-4x^2)^2(1-10x^2)$ 8. $y' = \dfrac{48x(x^2-3)^3}{(x^2+3)^5}$

9. $y' = 20x^3(2x-5)^5(x-1)$ 10. $y' = \dfrac{x^2}{\sqrt{x^2+1}} + \sqrt{x^2+1} = \dfrac{2x^2+1}{\sqrt{x^2+1}}$ 11. $y' = \dfrac{(2x-5)^3(2x+23)}{(x+1)^4}$

12. $y' = \dfrac{318(10x-1)^5}{(3x+5)^7}$ 13. $y' = (x-2)^2(x^2+9)^3(11x^2-16x+27)$ 14. $y' = \dfrac{-3(1-x^2)^2(x^2+6x+1)}{8(x+3)^4}$

15. $y' = \dfrac{6(-9x+7)}{(3x+5)^5}$ 16. $y' = \dfrac{2(2x^2-5)^2(4x^2+48x+5)}{(x+8)^3}$ 17. $f'(x) = \dfrac{-6x^3(7x-16)}{(4x-8)^{3/2}}$

18. $g'(x) = 8\left(\dfrac{2x+5}{6-x^2}\right)^3\left(\dfrac{(x+2)(x+3)}{(6-x^2)^2}\right) = \dfrac{8(2x+5)^3(x+2)(x+3)}{(6-x^2)^5}$ 19. $y' = \dfrac{-18(2+x)}{(4x+x^2)^{10}}$

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