

Find the derivative of each of the following functions. Do your work on a separate page.

1. $y = (x^2 + 4x + 6)^5$

11. $y = \tan(3x)$

2. $f(x) = (x^3 - 5x)^4$

12. $y = 4\sec(5x)$

3. $f(x) = (3x - 2)^{10} (5x^2 + 1)^{12}$

13. $y = \cos(x^3)$

4. $f(x) = (6x^2 + 5)^3 (x^3 - 7)^4$

14. $y = \cos^3(x)$

5. $y = (2x^2 - 6x + 1)^8$

15. $f(x) = (1 + \cos^2 x)^6$

6. $y = \sqrt{x^2 - 7x}$

16. $y = \tan(x^2) + \tan^2(x)$

7. $y = \frac{1}{(x^2 - 2x - 5)^4}$

17. $y = \cos(\tan x)$

8. $f(x) = \left(x - \frac{1}{x}\right)^{\frac{3}{2}}$

18. $y = \sin^3(x) + \cos^3(x)$

9. $y = \left(\frac{x-6}{x+7}\right)^3$

19. $y = \sin^2(\cos(4x))$

20. $y = \frac{\sin^2(x)}{\cos(x)}$

10. $y = \frac{1}{\sqrt[3]{2x-1}}$

21. $y = \sin^3(2x+3)$

Chain Rule Answers

$$1. y' = 5(2x+4)(x^2+4x+6)^4$$

$$2. f'(x) = 4(3x^2-5)(x^3-5x)^3$$

$$3. f'(x) = 30(3x-2)^9(5x^2+1)^{11}(17x^2-8x+1)$$

$$4. f'(x) = 12x(6x^2+5)^2(x^3-7)^3(9x^3+5x-21)$$

$$5. y' = -16(2x-3)(2x^2-6x+1)^9 \text{ or}$$
$$y' = \frac{-16(2x-3)}{(2x^2-6x+1)^9}$$

$$6. y' = \frac{1}{2}(2x-7)(x^2-7x)^{\frac{1}{2}} \text{ or } y' = \frac{(2x-7)}{2\sqrt{x^2-7x}}$$

$$7. y' = -8(x-1)(x^2-2x-5)^5 \text{ or}$$
$$y' = \frac{-8(x-1)}{(x^2-2x-5)^5}$$

$$8. f'(x) = \frac{3}{2}\left(x - \frac{1}{x}\right)^{\frac{1}{2}}\left(1 + \frac{1}{x^2}\right)$$

$$9. y' = \frac{39(x-6)^2}{(x+7)^4}$$

$$10. y' = \frac{-2}{\sqrt[3]{(2x-1)^6}}$$

$$11. y' = 3\sec^2 3x$$

$$12. y' = 20\sec 5x \tan 5x$$

$$13. y' = -3x^2 \sin(x^3)$$

$$14. y' = -3 \sin x \cos^2 x$$

$$15. f'(x) = -12 \cos x \sin x (1 + \cos^2 x)^5$$

$$16. y' = 2x \sec^2(x^2) + 2 \tan x \sec^2 x$$

$$17. y' = -\sec^2 x \sin(\tan x)$$

$$18. y' = 3 \sin^2 x \cos x - 3 \cos^2 x \sin x$$

$$19. y' = -8 \sin 4x \sin(\cos(4x)) \cos(\cos 4x)$$

$$20. y' = \frac{2 \sin x \cos^2 x + \sin^3 x}{\cos^2 x}$$

$$21. y' = 6 \cos(2x+3) \sin^2(2x+3)$$