

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. $y = \frac{1}{\sqrt[5]{2x-1}}$

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

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

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

7. $y' = -8(x - 1)(x^2 - 2x - 5)^{-5}$ 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. $y' = \frac{-2}{\sqrt[5]{(2x - 1)^6}}$

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