

The Weekly Rigor

No. 176

“A mathematician is a machine for turning coffee into theorems.”

November 4, 2017

101 Problems in Calculating Derivatives Using the Chain Rule with Solutions (Part 12)

SET 2 ANSWERS

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

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

$$5. f'(x) = \frac{5x}{3} (3x+2)^3 \sqrt[3]{(x^3+x^2+4)^2}$$

$$7. f'(x) = 3 \left(\frac{x^4-x^5}{x^2+x^3} \right)^2 \left(\frac{x^5(4-5x)(1+x) - x^5(1-x)(2+3x)}{(x^2+x^3)^2} \right)$$

$$9. f'(x) = 44 \left(\frac{x-3}{x+8} \right)^3$$

$$11. f'(x) = 8x(x^2+3)^3$$

$$13. f'(x) = \frac{9}{2} x^2 \sqrt{x^3+4}$$

$$15. f'(x) = \frac{-5(3x^2+1)}{2\sqrt{(x^3+x)^7}}$$

$$17. f'(x) = 5x(x^3+x^2+2)^4(3x+2)$$

$$19. f'(x) = \frac{-6x}{(x^2+2)^4}$$

$$21. f'(x) = \frac{4}{3} \left(x^{\frac{1}{2}} + x^{\frac{2}{3}} \right)^{\frac{1}{3}} \left(\frac{1}{2} x^{-\frac{1}{2}} + \frac{2}{3} x^{-\frac{1}{3}} \right)$$

$$23. f'(x) = \frac{-3x(5x^3+2)}{(x^5+x^2)^4}$$

$$2. f'(x) = \frac{3}{2} x^2 (x^3+1)^{-\frac{1}{2}} (x^2+1)^4 + 8x(x^3+1)^{\frac{1}{2}} (x^2+1)^3$$

$$4. f'(x) = \frac{2}{15} x^{-\frac{1}{3}} \left(1 + x^{\frac{2}{3}} \right)^{-\frac{4}{5}}$$

$$6. f'(x) = \frac{2(2x+1)}{3\sqrt[3]{x^2+x}}$$

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

$$10. f'(x) = 5 \left(\frac{x^2-4}{x^3+7} \right)^4 \left(\frac{-x^4+14x+12x^2}{(x^3+7)^2} \right)$$

$$12. f'(x) = \frac{-1}{3\sqrt[3]{(x-1)^4}}$$

$$14. f'(x) = 2 \left(x^{\frac{1}{3}} + x^2 \right) \left(\frac{1}{3} x^{-\frac{2}{3}} + 2x \right)$$

$$16. f'(x) = 3 \left(x^{\frac{2}{3}} + x^{\frac{1}{2}} \right)^2 \left(\frac{2}{3} x^{-\frac{1}{3}} + \frac{1}{2} x^{-\frac{1}{2}} \right)$$

$$18. f'(x) = \frac{x}{\sqrt{x^2+3}}$$

$$20. f'(x) = -\frac{1}{4} \left(x^{\frac{1}{2}} + x \right)^{-\frac{5}{4}} \left(\frac{1}{2} x^{-\frac{1}{2}} + 1 \right)$$

$$22. f'(x) = \frac{x(3x+2)}{4\sqrt[4]{(x^3+x^2+4)^3}}$$

$$24. f'(x) = \frac{-3x(5x^3+2)}{7\sqrt[7]{(x^5+x^2)^{10}}}$$

25. $f'(x) = 9x^2(x^3 + 1)^2(5 + x^2)^4 + 8x(x^3 + 1)^3(5 + x^2)^3$

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

27. $f'(x) = \frac{4}{3}\left(x^{\frac{5}{3}} + x^{\frac{9}{10}}\right)^{\frac{1}{3}}\left(\frac{5}{3}x^{\frac{2}{3}} + \frac{9}{10}x^{-\frac{1}{10}}\right)$

28. $f'(x) = -\frac{2}{5}\left(x^{\frac{1}{2}} + x^{\frac{1}{3}}\right)^{-\frac{7}{5}}\left(\frac{1}{2}x^{-\frac{1}{2}} + \frac{1}{3}x^{-\frac{2}{3}}\right)$

29. $f'(x) = -4\left(x^{\frac{3}{4}} + x^{\frac{1}{2}}\right)^{-5}\left(\frac{3}{4}x^{-\frac{1}{4}} + \frac{1}{2}x^{-\frac{1}{2}}\right)$

30. $f'(x) = 8x(x^2 + 3)^3(x^2 + 2)^{\frac{3}{2}} + 3x(x^2 + 3)^4(x^2 + 2)^{\frac{1}{2}}$

31. $f'(x) = \frac{-5(4x^3+1)}{6\sqrt{(x^4+x)^{11}}}$

32. $f'(x) = 3x\sqrt{x^2 + 2}$

“Only he who never plays, never loses.”