101 Problems in Calculating Derivatives Using the Chain Rule with Solutions
(Part 17)

SET 4 ANSWERS

1. $f'(x) = e^x \cos(e^x)$

2. $f'(x) = 2e^{2x+e^{2x}}$

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

4. $f'(x) = \frac{2e^{\arcsin(2x)}}{\sqrt{1-4x^2}}$

5. $f'(x) = \frac{2}{x}$

6. $f'(x) = 2\sin(x)\cos(x)$

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

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

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

10. $f'(x) = \frac{\cos\left(\ln\left(e^{\sqrt{x}}\right)\right)}{2\sqrt{x}\left(1+\sin^2\left(\ln\left(e^{\sqrt{x}}\right)\right)\right)}$

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

12. $f'(x) = \frac{2e^{2x}\sin(3x)+3\cos(3x)e^{2x}}{\sin^2(3x)}$

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

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

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

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

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

18. $f'(x) = -6\sin(2x)\cos(\cos(2x))\sin^2(\cos(2x))$

19. $f'(x) = \frac{2}{x}$

20. $f'(x) = \frac{3}{1+9x^2}$

21. $f'(x) = e^{2x}\tan^2(x)\left[2\tan(x)+3\sec^2(x)\right]$

22. $f'(x) = \frac{2}{5}e^{\frac{2}{5}x}$

23. $f'(x) = \frac{6x\arcsin^2(x^2)}{\sqrt{1-x^4}}$

24. $f'(x) = \frac{1}{x}$

25. $f'(x) =$
$24x^3 \cos\left(\sin^2\left(\sin^3(x^4)\right)\right)\left(\sin\left(\sin^3(x^4)\right)\right)\left(\cos\left(\sin^3(x^4)\right)\right)\left(\sin^2(x^4)\right)\left(\cos(x^4)\right)$

26. $f'(x) = 3(e^x + e^{-x})^2(e^x - e^{-x})$

27. $f'(x) = 4\tan^3(x)\sec^2(x)$

28. $f'(x) = \dfrac{1}{2\sqrt{x}(1+\sqrt{x})}$

29. $f'(x) = 2x$

30. $f'(x) = \dfrac{\cos(\arctan(x))}{1+x^2}$

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

32. $f'(x) = -8xe^{\sin(x^2)}\cos(x^2)\tan\left(e^{\sin(x^2)}\right)\ln^3\left(\cos\left(e^{\sin(x^2)}\right)\right)$

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

34. $f'(x) = 3\cos(3x)$

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

36. $f'(x) = \cot(x)$

37. $f'(x) = 3x^2 e^{x^3}$

38. $f'(x) = -10x\cos^4(x^2)\sin(x^2)$

39. $f'(x) = e^{x+e^x}$

40. $f'(x) = 3\sec^2(3x)$

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

42. $f'(x) = \dfrac{\cos(x)}{1+\sin^2(x)}$

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

44. $f'(x) = -4\sin(4x)e^{\cos(4x)}$

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

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

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

48. $f'(x) = \sec^2(\sin(x))\cos(x)$

49. $f'(x) = 2x$

50. $f'(x) = \dfrac{6\arctan(x)}{1+9x^2}$

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