The Weekly Rigor

101 Problems in Calculating Derivatives Using the Chain Rule with Solutions
(Part 13)

SET 3 PROBLEMS

Find the derivative $f'(x)$ of each of the following functions.

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

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

3. $f(x) = \sqrt{x^3 + 1}(x^2 + 1)^4$

4. $f(x) = \ln(3x^2)$

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

6. $f(x) = \left(\ln^2(x^5) - \ln(x)\right)^{-2}$

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

8. $f(x) = \sqrt[5]{1 + x^{\frac{2}{3}}}$

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

10. $f(x) = (e^x + e^{-x})^3$

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

12. $f(x) = \ln(1 + \sqrt{x})$

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

14. $f(x) = \ln(x^2)$

15. $f(x) = \left(\sqrt{x^3 + 4}\right)^3$

16. $f(x) = \ln(e^{x^2})$

17. $f(x) = \left(\frac{x-3}{x+8}\right)^4$

18. $f(x) = e^{x^3}$

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

20. $f(x) = (x^2 + 3)^4$

21. $f(x) = \ln(3x)$

22. $f(x) = \frac{1}{\sqrt[3]{x-1}}$

23. $f(x) = e^{\ln(x^2)}$

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

25. $f(x) = \frac{1}{\left(\sqrt[3]{x} + x^2\right)^{-2}}$

26. $f(x) = \frac{1}{\sqrt{(x^3+x)^5}}$

27. $f(x) = e^{e^x}$

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

29. $f(x) = \ln(2x)$

30. $f(x) = (x^3 + x^2 + 2)^5$

31. $f(x) = \ln^4(3x^5)$

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

33. $f(x) = e^{\ln(x)}$

34. $f(x) = (x^2 + 2)^{-3}$

35. $f(x) = \ln(\ln(x))$

36. $f(x) = (x^2 + 2)^{\frac{3}{2}}$

37. $f(x) = \left(\sqrt{x} + \sqrt[3]{x^2}\right)^{\frac{4}{3}}$

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

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

40. $f(x) = \frac{1}{\sqrt{e^{2x} - e^{3x}}}$

41. $f(x) = (\ln(2x) + \ln(x))^3$

42. $f(x) = \frac{1}{(x^5 + x^2)^3}$

43. $f(x) = \ln^3(5x)$

44. $f(x) = \frac{1}{(x^5 + x^2)^{\frac{3}{7}}}$

45. $f(x) = (x^3 + 1)^3(5 + x^2)^4$

46. $f(x) = \frac{1}{(x^4 + x)^{\frac{5}{6}}}$

47. $f(x) = \left(\sqrt[3]{x^5} + \sqrt[5]{x^{\frac{9}{2}}}\right)^{\frac{4}{3}}$

48. $f(x) = e^{3x}$

49. $f(x) = \frac{1}{\sqrt[5]{\left(\sqrt{x} + x^{\frac{1}{3}}\right)^2}}$

50. $f(x) = \ln(\ln(2x))$

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

52. $f(x) = \ln(e^x)$

53. $f(x) = (x^2 + 3)^4(x^2 + 2)^{\frac{3}{2}}$

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

55. $f(x) = \ln^2(x)$

56. $f(x) = \frac{1}{\sqrt[4]{\sqrt{x} + x}}$