

Practice Problems | Derivatives

Find y' for each equation

Basic Derivatives

1. $y = 3x + 2$

9. $y = \frac{3}{x^2}$

2. $y = x^2 - 2x + 1$

10. $y = x \sin x$

3. $y = \frac{x}{5}$

11. $y = \csc x$

4. $y = x(3x^2 + 2)$

12. $y = \tan x$

5. $y = \frac{x+1}{3x+2}$

13. $y = \sec x$

6. $y = 6x^3 + 4x^2$

14. $y = \cot x$

7. $y = x^{\frac{1}{2}}$

15. $y = \sin x$

8. $y = \frac{4}{5-x}$

16. $y = \cos x$

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Chain Rule Derivatives

17. $y = \sin 2x$

25. $y = (\sec x)^{\frac{3}{2}}$

18. $y = \csc\left(\frac{\pi}{4} - x\right)$

26. $y = (3x - 5)^8$

19. $y = (\tan x)^3$

27. $y = (\cot 4x)^3$

20. $y = (2x - 1)^5$

28. $y = \frac{(1-x)^4}{(3x+1)^3}$

21. $y = \left(\cos\left(\frac{x}{3}\right)\right)^4$

29. $y = \left(\frac{3+x}{2-x}\right)^2$

22. $y = (5x + 1)^6(2x - 3)$

30. $y = \frac{\sqrt{2x+1}}{3x-4}$

23. $y = 3 \sec\left(\frac{x}{2}\right)$

31. $y = 3(5x + 1)^{-2}$

24. $y = \tan x^2$

32. $y = (1 - x)^4(3x + 1)^{-3}$

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Trig and Exponential Derivatives

33. $y = 7 \csc^{-1}(2x^2)$

41. $y = 3 \cot^{-1}(e^x)$

34. $y = 4 \tan^{-1}(x + 1)$

42. $y = xe^{\sin x}$

35. $y = x \cot^{-1} x$

43. $y = e^{\frac{1}{x}}$

36. $y = 3 \cos^{-1}\left(\frac{x}{2}\right)$

44. $y = 2^x$

37. $y = e^{3x}$

45. $y = 5^{3x}$

38. $y = e^{x^2-3}$

46. $y = 4^{x^2+1}$

39. $y = 4e^{\cot x}$

47. $y = 3^{\tan^{-1} x}$

40. $y = \frac{1}{e^{5x}}$

48. $y = x(5^x)$

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Logarithmic Function Derivatives

49. $y = \ln(x + 2)$

55. $y = \ln\left(\frac{8x}{(1-x)^3}\right)$

50. $y = x \ln x$

56. $y = e^{\ln x}$

51. $y = \ln\sqrt{1 - 2x}$

57. $y = \frac{x}{\ln x}$

52. $y = \ln e^x$

58. $y = \sin(\ln x)$

53. $y = \ln(\ln x)$

59. $y = \log_4 x$

54. $y = \ln(x^2)$

60. $y = \log_x 4$

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Answer Key

- 3
- $2x - 2$
- $\frac{1}{5}$
- $4x^2 + 2$
- $-\frac{1}{(3x+2)^2}$
- $18x^2 + 4x$
- $\frac{1}{2x^2}$
- $-\frac{4}{(5-x)^2}$
- $-\frac{6}{x^3}$
- $x\cos x + \sin x$
- $-\csc x \cot x$
- $\sec^2 x$
- $\sec x \tan x$
- $-\csc^2 x$
- $\cos x$
- $\sin x$
- $2\cos 2x$
- $\csc\left(\frac{\pi}{4} - x\right) \cot\left(\frac{\pi}{4} - x\right)$
- $3\sec^2(x) \tan^2(x)$
- $10(2x - 1)^4$
- $-\frac{4}{3}\cos^3\left(\frac{x}{3}\right) \sin\left(\frac{x}{3}\right)$
- $2(5x + 1)^5(35x - 44)$
- $\frac{3}{2}\sec\left(\frac{x}{2}\right) \tan\left(\frac{x}{2}\right)$
- $2x\sec^2(x^2)$
- $\frac{3}{2}(\sec x)^2 \tan x$
- $24x(3x - 5)^7$
- $-12 \cot^2(4x) \csc^2(4x)$
- $\frac{(1-x)^3(-3x-14)}{(3x+1)^4}$
- $\frac{10(3+x)}{(2-x)^3}$
- $\frac{-3x-7}{(2x+1)^{\frac{1}{2}}(3x-4)^2}$
- $-\frac{30}{(5x+1)^3}$
- $\frac{(1-x)^3(3x-13)}{(3x+1)^4}$

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Answer Key

$$33. \frac{-14x}{x\sqrt{4x^4-1}}$$

$$34. \frac{4}{x^2+2x+2}$$

$$35. \frac{-x}{1+x^2} + \cot^{-1} x$$

$$36. -\frac{3}{\sqrt{4-x^2}}$$

$$37. 3e^{3x}$$

$$38. (2x-3)e^{x^2-3x}$$

$$39. -4 \csc^2 x e^{\cot x}$$

$$40. -\frac{5}{e^{5x}}$$

$$41. \frac{-3e^x}{1+e^{2x}}$$

$$42. e^{\sin x}(x \cos x + 1)$$

$$43. -\frac{e^{\frac{1}{x}}}{x^2}$$

$$44. (\ln 2)2^x$$

$$45. 3(\ln 5)5^{3x}$$

$$46. 2(\ln 4)x4^{x^2+1}$$

$$47. \frac{(\ln 3)(3^{\tan^{-1} x})}{1+x^2}$$

$$48. 5^x((\ln 5)x + 1)$$

$$49. \frac{1}{x+2}; x > -2$$

$$50. \ln x + 1; x > 0$$

$$51. -\frac{1}{1-2x}; x < \frac{1}{2}$$

$$52. 1$$

$$53. \frac{1}{x \ln x}; x > 1$$

$$54. \frac{2}{x}; x \neq 0$$

$$55. \frac{1}{x} + \frac{3}{1-x}; 0 < x < 1$$

$$56. 1; x > 0$$

$$57. \frac{\ln x - 1}{(\ln x)^2}$$

$$58. \frac{\cos(\ln x)}{x}; x \neq 0$$

$$59. \frac{1}{(\ln 4)(x)}; x > 0$$

$$60. \frac{-(\ln 4)}{x(\ln x)^2}$$