

Derivative of Exponential and Log and Exponential Function ... Set 2

Exponential Functions e^x Classwork Worksheet

exponent properties: $e^a e^b = e^{a+b}$ $\frac{e^a}{e^b} = e^{a-b}$ $\frac{d}{dx} e^u = e^u \cdot u'$

Additional $y = \ln x$ and $y = e^x$ Properties: $e^{\ln x} = x$ $\ln e^x = x$ $\ln 1 = 0$ $\ln e = 1$

Solving an Exponential or Logarithmic Equation In Exercises 1–16, solve for x accurate to three decimal places.

1. $e^{\ln x} = 4$

2. $e^{\ln 3x} = 24$

3. $e^x = 12$

4. $5e^x = 36$

5. $9 - 2e^x = 7$

8. $100e^{-2x} = 35$

11. $\ln x = 2$

12. $\ln x^2 = 10$

13. $\ln(x - 3) = 2$

14. $\ln 4x = 1$

15. $\ln \sqrt{x + 2} = 1$

16. $\ln(x - 2)^2 = 12$

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Finding a Derivative In Exercises 33–54, find the derivative

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

34. $y = e^{-8x}$

35. $y = e^{\sqrt{x}}$

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

39. $y = e^x \ln x$

40. $y = xe^{4x}$

41. $y = x^3 e^x$

42. $y = x^2 e^{-x}$

43. $g(t) = (e^{-t} + e^t)^3$

44. $g(t) = e^{-3/t^2}$

45. $y = \ln(1 + e^{2x})$

46. $y = \ln\left(\frac{1 + e^x}{1 - e^x}\right)$

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Finding a Derivative In Exercises 33–54, find the derivative

$$\frac{d}{dx}[\sin u] = (\cos u)u'$$

$$\frac{d}{dx}[\cot u] = -(\csc^2 u)u'$$

$$14. \frac{d}{dx}[\cos u] = -(\sin u)u'$$

$$17. \frac{d}{dx}[\sec u] = (\sec u \tan u)u'$$

$$15. \frac{d}{dx}[\tan u] = (\sec^2 u)u'$$

$$18. \frac{d}{dx}[\csc u] = -(\csc u \cot u)u'$$

$$47. y = \frac{2}{e^x + e^{-x}}$$

$$48. y = \frac{e^x - e^{-x}}{2}$$

$$49. y = \frac{e^x + 1}{e^x - 1}$$

$$50. y = \frac{e^{2x}}{e^{2x} + 1}$$

$$51. y = e^x(\sin x + \cos x)$$

$$52. y = e^{2x} \tan 2x$$

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Finding an Equation of a Tangent Line In Exercises 55–62, find an equation of the tangent line to the graph of the function at the given point.

Steps for finding Tangent Line Equation:

- 1) Identify Ordered Pair: Point: _____
- 2) Find Slope: Find $f'(x)$ and evaluate the slope at x-value: Slope: $m =$ _____
- 3) Put equation into point-slope form: $y - y_1 = m(x - x_1)$

55. $f(x) = e^{3x}$, (0, 1)

56. $f(x) = e^{-2x}$, (0, 1)

57. $f(x) = e^{1-x}$, (1, 1)

58. $y = e^{-2x+x^2}$, (2, 1)

59. $f(x) = e^{-x} \ln x$, (1, 0)

62. $y = xe^x - e^x$, (1, 0)

Derivative of Exponential and Log and Exponential
Function ... Set 2

Implicit Differentiation In Exercises 63 and 64, use implicit differentiation to find dy/dx .

63. $xe^y - 10x + 3y = 0$

64. $e^{xy} + x^2 - y^2 = 10$

Finding the Equation of a Tangent Line In Exercises 65 and 66, find an equation of the tangent line to the graph of the function at the given point.

65. $xe^y + ye^x = 1, (0, 1)$

66. $1 + \ln xy = e^{x-y}, (1, 1)$

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Ch. 5.5 Log and Exponential Derivatives for base a

$$11. \frac{d}{dx}[\log_a u] = \frac{u'}{(\ln a)u}$$

$$12. \frac{d}{dx}[a^u] = (\ln a)a^u u'$$

Find the Derivative of the below functions: (Consider Expanding Log Expressions before Deriving if applicable)

$$39. y = 5^{-4x}$$

$$40. y = 6^{3x-4}$$

$$41. f(x) = x 9^x$$

$$42. y = x(6^{-2x})$$

$$49. h(t) = \log_5(4 - t)^2$$

$$48. y = \log_3(x^2 - 3x)$$

$$51. y = \log_5 \sqrt{x^2 - 1}$$

$$50. g(t) = \log_2(t^2 + 7)^3$$

$$53. f(x) = \log_2 \frac{x^2}{x-1}$$

$$52. f(x) = \log_2 \sqrt[3]{2x+1}$$

$$55. h(x) = \log_3 \frac{x\sqrt{x-1}}{2}$$

$$56. g(x) = \log_5 \frac{4}{x^2\sqrt{1-x}}$$