



## Derivatives of Logarithms

Find the Derivatives (from 5.1)

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

49.  $g(x) = \ln x^2$

53.  $y = \ln(t + 1)^2$

55.  $y = \ln(x\sqrt{x^2 - 1})$

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

63.  $y = \ln\sqrt{\frac{x+1}{x-1}}$

71.  $y = \ln\left|\frac{\cos x}{\cos x - 1}\right|$

74.  $y = \ln\sqrt{2 + \cos^2 x}$

Use implicit differentiation to find an equation of the tangent line to the graph at the given point.

87.  $x + y - 1 = \ln(x^2 + y^2), \quad (1, 0)$

88.  $y^2 + \ln xy = 2, \quad (e, 1)$

### Find the Derivative (5.4)

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

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

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

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

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

Find the second derivative

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

### Other Bases! Find these derivatives using the rules for bases other than $e$ . (5.5)

41.  $f(x) = 4^x$

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

51.  $y = \log_4(5x + 1)$

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

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

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

### Use logarithmic differentiation to solve these (i.e. take the natural log first)

67.  $y = x^{2/x}$

69.  $y = (x - 2)^{x+1}$

