

Section 3.2 – Derivatives of Logarithmic Functions
Section 3.3 – Derivatives of Exponential & Inverse Trig Functions

Find dy/dx .

5. $y = \ln |x^2 - 1|$

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

15. $y = x^2 \log_2(3 - 2x)$

17. $y = \frac{x^2}{1+\log x}$

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

25. $y = \log(\sin^2 x)$

27. Find $\frac{d}{dx} [\ln((x-1)^3(x^2+1)^4)]$

Find $\frac{dy}{dx}$ using logarithmic differentiation.

35. $y = x^3 \sqrt{1+x^2}$

37. $y = \frac{(x^2-8)^{1/3} \sqrt{x^3+1}}{x^6-7x+5}$

39. a) Find $\frac{d}{dx} [\log_x e]$

47. Find a formula for the area $A(w)$ of the triangle bounded by the tangent line to the graph of $y = \ln x$ at $P(w, \ln w)$, the horizontal line through P , and the y -axis.

Find the limit by interpreting the expression as an appropriate derivative.

53. a) $\lim_{x \rightarrow 0} \frac{\ln(1+3x)}{x}$

54. b) $\lim_{w \rightarrow 1} \frac{\ln w}{w-1}$

1. Let $f(x) = x^5 + x^3 + x$.

a. Show that f is one-to-one and confirm that $f(1)=3$.

b. Find $(f^{-1})'(3)$.

5. Determine whether the function f is one-to-one by examining the sign of $f'(x)$.

a. $f(x) = x^2 + 8x + 1$

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

c. $f(x) = 2x + \sin x$

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

Find dy/dx .

15. $y = e^{7x}$

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

21. $y = e^{x \tan x}$

25. $y = \ln(1 - xe^{-x})$

Find dy/dx using the method of logarithmic differentiation.

33. $y = (\ln x)^{\tan x}$

35. $y = (\ln x)^{\ln x}$

Find dy/dx .

43. $y = \sin^{-1}(3x)$

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

51. $y = e^x \sec^{-1} x$

55. $y = \sec^{-1} x + \csc^{-1} x$

67. a. Show that $f(x) = x^3 - 3x^2 + 2x$ is not one-to-one on $(-\infty, \infty)$.
b. Find the largest value of k such that f is one-to-one on the interval $(-k, k)$
73. a. Show that $y = xe^{-x}$ satisfies the equation $xy' = (1 - x)y$
b. Show that $y = xe^{-x^2/2}$ satisfies the equation $xy' = (1 - x^2)y$