

WARM UP

1. Find dy/dx of $xe^x + 8x - 3y = 0$
2. Find the slope of the graph $y = 2\sin(\pi x - y)$ at $(1,0)$

Derivatives of Logarithmic Functions (Day One)

Objective:

- Find the derivative of logarithmic functions.

Derivative of the natural log:

$$\frac{d}{dx} [\ln x] = \frac{1}{x}$$

or more formally,

$$\frac{d}{dx} [\ln f(x)] = \frac{1}{f(x)} \cdot f'(x)$$

Ex.1: Find $f'(x)$ of $f(x) = \ln(x^3 + 1)$

Ex. 2: Find $h'(x)$ of $h(x) = \cos(\ln x)$

Ex. 3: Find dy/dx if $y = \ln(1 + \ln x)$

Derivative of a log function

$$\frac{d}{dx} [\log_b f(x)] = \frac{1}{f(x)} \cdot \frac{1}{\ln b} \cdot f'(x)$$

Ex.4: Find $\frac{dy}{dx}$ of $y = \log_2\left(\frac{1}{x}\right)$

Ex. 5: If $f(x) = \left(\log_3(5 - x^4)\right)^2$, find $f'(x)$.

44. $h(x) = \ln(2x^2 + 1)$

46. $y = x^2 \ln x$

48. $y = \ln \sqrt{x^2 - 4}$

50. $y = \ln[t(t^2 + 3)^3]$

52. $f(x) = \ln\left(\frac{2x}{x + 3}\right)$

54. $h(t) = \frac{\ln t}{t}$

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

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

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

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

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

Write equation of
tangent line.