

WARM UP

1. Given the curve $xy^2 - x^3y = 6$,

(a) Find dy/dx .

(b) Find all points on the curve whose x-coordinate is 1, and write an equation for the tangent line at each of these points.

Derivatives of Logarithmic Functions (Day Two)

Objective:

- Use Logarithmic Differentiation to take the derivatives.

THEOREM 5.2 Logarithmic Properties

If a and b are positive numbers and n is rational, then the following properties are true.

1. $\ln(1) = 0$

2. $\ln(ab) = \ln a + \ln b$

3. $\ln(a^n) = n \ln a$

4. $\ln\left(\frac{a}{b}\right) = \ln a - \ln b$

Ex.1: Use log properties to expand, then take derivative.

$$f(x) = \ln \sqrt{x + 1}$$

Ex.2: Use log properties to expand, then take derivative.

$$f(x) = \ln \sqrt{\frac{3x + 2}{3x - 2}}$$

Logarithmic Differentiation

Sometimes its useful to involve natural logs to take derivatives.

1. If the expression is complicated with lots of factors and/or radicals and exponents (optional)
2. If you have a function raised to a function. $y = f(x)^{g(x)}$ (not optional)

Ex.3: $\frac{d}{dx} [\sin x^{\cos x}]$

Ex.4: Find $f'(x)$ of $y = x^{\ln x}$