

The Derivative of Exponential Functions

Objective: Use log differentiation to find derivatives.

Skills:

- Find the derivative of $y = 2^x$.
- Use the log differentiation process to find the derivative of $y = b^x$, where b is a constant.

Examples:

1. Find the derivative of $y = 5^{3x}$.

2. Differentiate $y = \frac{e^x \sqrt{x^2 + 1}}{(x^2 + 2)^3}$ by taking the ln of both sides. This is referred to as logarithmic Differentiation.

3. Use logarithmic differentiation to prove the power rule, n is a whole number. Use the equation $y = x^n$.

4. Use logarithmic differentiation to find the derivative of

a) $y = (x^2 + 1)^4 (x^3 + 2x^2)^3$

b) $y = x^{x^2+5}$ (only possible using ln differentiation- not a constant for a base, not a constant for an exponent)