

SECTION 3-9: DERIVATIVES OF EXPONENTIAL FUNCTIONS AND LOGARITHMS

1. Quick Review of Implicit Differentiation: Find dy/dx for $x^2 - y^3 = x \sin(y)$.

2. Derivative Rules for Exponential Functions

3. Examples:

(a) $y = x^4 e^x$

(b) $y = e^{x^2}$

(c) $y = 5^{-x}$

(d) $f(x) = x^5 + 5^x$

4. Let $P(t) = P_0 e^{kt}$. Write $P'(t)$ in terms of $P(t)$.

5. Write $y = \log_2(x)$ and $y = \ln(x)$ in terms of exponential functions.

6. Use the expressions in #5 to find formulas for the derivatives of $y = \log_2(x)$ and $y = \ln(x)$.

7. Examples:

(a) $y = x \ln(x)$

(b) $y = \log(x^2 - 5)$

(c) $y = \ln\left(\frac{x(x^2+1)^3}{100(x+1)}\right)$

(d) $y = (\sin(x))^x$