Differentiation of Exponential Functions

Graph $f(x) = e^x$ on the graphing calculator then use the **nderiv** function to graph its derivative.

$$\frac{dy}{dx} e^u = e^u \frac{du}{dx}$$

EX) Differentiate each function below.

A) $f(x) = e^{3x-2}$

B) $f(x) = x^2 e^{\sin x}$

C) $f(x) = \dfrac{e^{x^3}}{x^2}$

Graph $f(x) = 2^x$ on the graphing calculator then use the **nderiv** function to graph its derivative.

$$\frac{dy}{dx} b^u = \ln b \bullet b^u \frac{du}{dx}$$

EX) Differentiate $f(x) = 5^{-x^2}$

EX) Find $\dfrac{dy}{dx}$ for $x^2 e^y + xy = e^x$

If the half-life of a $24,000 swimming pool is 7 years, what is the **rate** of decrease in its value in the 10th year(assuming the value decreases exponentially)?

$100,000 is invested for 10 years at a rate of 5%. What is the **rate** of growth(in $/year) in that 10th year?

Higher Order Derivatives AP Example (Hint: Find the first four derivatives to help you select the correct answer)

Let f be the function given by $f(x) = \sin x + e^{-x} + 3x$. Which of the following statements is true for $y = f(x)$?

(A) $y'' = \sin x + e^{-x}$

(B) $\dfrac{d^3 y}{dx^3} = \dfrac{dy}{dx}$

(C) $f^{(4)}(x) = f'(x) \cdot f'''(x)$

(D) $y - \dfrac{d^4 y}{dx^4} = 3x$