

Some Differentiation Rules

Basic Rules

- Derivative of a Constant: $\frac{d}{dx}[c] = 0$.

Example 1: $\frac{d}{dx}[12] =$ $\frac{d}{dx}[1,000,000] =$

- The Power Rule: (powers of x) $\frac{d}{dx}[x^n] = nx^{n-1}$.

Example 2: $\frac{d}{dx}[x^5] =$

$\frac{d}{dx}[\sqrt[3]{x}] =$

- Constant Multiple: Let c be a constant. $\frac{d}{dx}[cf(x)] = c \left[\frac{d}{dx}(f(x)) \right]$.

Example 3: $\frac{d}{dx}[4x^3] =$

- Sum/Difference Rule: $\frac{d}{dx}[f(x) \pm g(x)] = \frac{d}{dx}[f(x)] \pm \frac{d}{dx}[g(x)]$

Example 4: $\frac{d}{dx} \left[3\sqrt[3]{x} - \frac{2}{x^3} + 7x \right] =$

Sine and Cosine

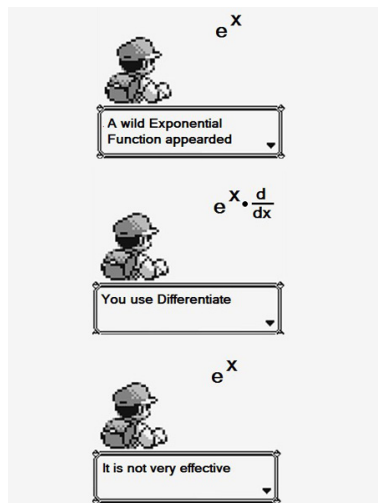
$$\frac{d}{dx} \sin(x) = \cos(x)$$

$$\frac{d}{dx} \cos(x) = -\sin(x)$$

Example 5: $\frac{d}{dx} [2 \sin(x) - 3 \cos(x)] =$

Exponential Function

$$\frac{d}{dx}e^x = e^x$$



Example 6: $\frac{d}{dx} [7e^x] =$

DIY

1. Find $f'(x)$ for the following function.

$$f(x) = \frac{3x^5 + x^{1.5}}{\sqrt{x}}$$

2. Find the equation of the tangent line to the graph of $y = 4 \cos(x)$ at $x = \frac{\pi}{2}$.

3. If $g(x) = (x - 1)(x + 2)$, find all values of x so that $g'(x) = -1$.