

September 22, 2023

Ice Cream Cone Day

Today in History:

Lincoln issues Emancipation Proclamation (1862)

Nathan Hale executed for spying (1776)

Number of the Day: 5545

5545 = 5×1109

5545 uses only the digits 1 and 2 in base 4 (1112221)

and base 7 (22111).

Fun Fact:

Antarctica's area code is 672.

Quote of the Day:

"When the President does it, that means that it's not illegal."

Richard M. Nixon

Today's Weather:

Rain showers early, becoming a steady light rain for the afternoon.
High 75°

Math 121

Quiz #13

Find $f'(x)$ for

$$f(x) = 3x^4 - \frac{3}{x^4} + 12$$

$$f(x) = 3x^4 - 3x^{-4} + 12$$

$$\begin{aligned} f'(x) &= 12x^3 + 12x^{-5} + 0 \\ &= 12x^3 + \frac{12}{x^5} \end{aligned}$$

mpod 13
* 7

$$f(x) = \frac{x + x^2}{x^3} = x^{-2} + x^{-1}$$

$$\begin{aligned} f'(x) &= -2x^{-3} - x^{-2} \\ &= -\frac{2}{x^3} - \frac{1}{x^2} \end{aligned}$$

$$*6 \quad f(x) = \sqrt{3x^3} = \sqrt{3} \sqrt{x^3} = \sqrt{3} x^{\frac{3}{2}}$$

$$f'(x) = \sqrt{3} \left(\frac{3}{2}\right) x^{\frac{1}{2}}$$

RULES

FUNCTION

C

x^N

$C f(x)$

$f(x) \pm g(x)$

e^x

DERIVATIVE

0

$N x^{N-1}$

$C f'(x)$

$f'(x) \pm g'(x)$

e^x

EXAMPLE 1

$$f(x) = x^2 + 3x$$

$$f'(x) = 2x + 3$$

EXAMPLE 2

$$f(x) = 1 + \frac{1}{x}$$

$$= 1 + x^{-1}$$

$$f'(x) = -x^{-2}$$

$$= -\frac{1}{x^2}$$

EXAMPLE 3

$$f(x) = \sqrt[3]{x^2}$$

$$f(x) = x^{\frac{2}{3}}$$

$$f'(x) = \frac{2}{3} x^{-\frac{1}{3}}$$

$$f'(x) = \frac{2}{3\sqrt[3]{x}}$$

EXAMPLE 4

$$f(x) = x^{\pi}$$

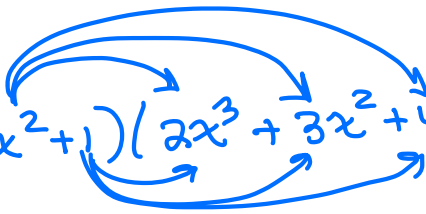
$$f'(x) = \pi x^{\pi-1}$$

EXAMPLE 5

$$\begin{aligned} f(x) &= e^{x+3} \\ &= e^x \cdot (e^3) \end{aligned}$$

$$\begin{aligned} f'(x) &= e^3 e^x \\ &= e^{x+3} \end{aligned}$$

EXAMPLE 6

$$f(x) = (x^2+1)(2x^3+3x^2+4x)$$


$$\begin{aligned} f(x) &= 2x^5 + 3x^4 + 4x^3 + 2x^3 + 3x^2 + 4x \\ &= 2x^5 + 3x^4 + 6x^3 + 3x^2 + 4x \end{aligned}$$

$$f'(x) = 10x^4 + 12x^3 + 18x^2 + 6x + 4$$

EXAMPLE 7

$$f(x) = (x^3+2)^2 = x^6 + 4x^3 + 4$$

$$f'(x) = 6x^5 + 12x^2 = 6x^2(x^3 + 2)$$

EXAMPLE 8

$$f(x) = \frac{x^4 + x^2 + 1}{x^4} = 1 + \frac{1}{x^2} + \frac{1}{x^4}$$

$$= 1 + x^{-2} + x^{-4}$$

$$f'(x) = 0 - 2x^{-3} - 4x^{-5}$$

$$= -\frac{2}{x^3} - \frac{4}{x^5}$$