

September 29, 2026

National Coffee Day

Today in History:

Willie Mays makes catch against the Cleveland Indians (1954)

Stacy Alison becomes the First American Woman to reach the summit of Mount Everest (1988)

Number of the Day: 4459

4459 = $7 \times 7 \times 7 \times 13$

4459 divides $18^{12} - 1$

Fun Fact:

The cruise liner QEII moves only 6 inches per gallon of diesel fuel.

Quote of the Day:

“Great things are done by a series of small things brought together.”

Vincent Van Gogh

Today's Weather:

Sunny and warm, high 73°

Math 121

Quiz #18

Find y' for

$$y = \frac{3 \sin x}{e^x + 2 \cos x}$$

$$y' = \frac{(e^x + 2 \cos x)(3 \cos x) - (3 \sin x)(e^x - 2 \sin x)}{(e^x + 2 \cos x)^2}$$

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$$y = e^x \cos x$$

$$x = 0$$

$$x = 0$$

$$y = e^0 \cos(0) = 1 \quad (0, 1)$$

$$\frac{dy}{dx} = \frac{e^x (-\sin x) + e^x \cos x}{} \Big|_{x=0} = 1$$

$$y - 1 = 1(x - 0)$$

$$\boxed{y = x + 1}$$

CHAIN RULE

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

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

$$f(x) = (x^2+1)^{20}$$

$$\underline{f(x) = x^{20}}$$

$$\underline{g(x) = x^2+1}$$

$$\frac{d}{dx}((f \circ g)(x)) = (f' \circ g)(x) \cdot g'(x)$$

$$y = u^{20}$$

$$\underline{u = x^2+1}$$

$$\frac{dy}{dx} = \frac{dy}{\cancel{du}} \cdot \frac{\cancel{du}}{dx}$$

$$\frac{dy}{du} = 20u^{19}$$

$$\frac{du}{dx} = 2x$$

$$\frac{dy}{dx} = 20(x^2+1)^{19} \cdot 2x$$

$$f(x) = (\text{blob})^N$$

$$f'(x) = N (\text{blob})^{N-1} \text{blob}'$$

EXAMPLE 1

$$f(x) = (3x - 2x^3)^5$$

$$f'(x) = 5(3x - 2x^3)^4 (3 - 6x^2)$$

EXAMPLE 2

$$f(x) = \underbrace{x^2} \underbrace{(1 - x^3)^4}$$

$$f'(x) = x^2 \left(4(1 - x^3)^3 (-3x^2) \right) + 2x(1 - x^3)^4$$

EXAMPLE 3

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

$$f'(x) = 3 \left(\frac{3x-1}{x^2+3} \right)^2 \left[\frac{(x^2+3)(3) - (3x-1)(2x)}{(x^2+3)^2} \right]$$

$$f(x) = e^x$$

$$f'(x) = e^x$$

$$f(x) = e^{xx}$$

$$f'(x) = \uparrow e^{xx}$$

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

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

$$= 6x e^{x^2}$$

$$f(x) = x e^{\sqrt{x}}$$

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

$$f(x) = \sin x$$

$$f'(x) = \cos x$$

$$f(x) = \sin(\text{scribble})$$

$$f'(x) = \text{scribble} \cos(\text{scribble})$$

$$f(x) = \sin(x^3)$$

$$f'(x) = 3x^2 \cos(x^3)$$

$$f(x) = \sin(2x)$$

$$f'(x) = 2 \cos(2x)$$

$$f(x) = \cos x$$

$$f'(x) = -\sin x$$

$$f(x) = \cos(\text{scribble})$$

$$f'(x) = -\text{scribble} \sin(\text{scribble})$$

$$f(x) = \cos(e^x)$$

$$f'(x) = -e^x \sin(e^x)$$

$$f(x) = (\cos(\sin(4x)))^3$$

$$f'(x) = 3 (\cos(\sin(4x)))^2 (-\sin(\sin(4x))) \cdot (\cos(4x))(4)$$

$$f(x) = \tan x$$

$$f(x) = \tan(\text{🕯})$$

$$f'(x) = \sec^2 x$$

$$f'(x) = \text{🕯} \sec^2(\text{🕯})$$

$$f(x) = \sec x$$

$$f(x) = \sec(\text{🍏})$$

$$f'(x) = \sec x \tan x$$

$$f'(x) = \text{🕯} \sec(\text{🍏}) \tan(\text{🍏})$$

$$f(x) = \cot x$$

$$f(x) = \cot(\text{🌳})$$

$$f'(x) = -\csc^2 x$$

$$f'(x) = -\text{🕯} \csc^2(\text{🌳})$$

$$f(x) = \csc x$$

$$f(x) = \csc(\text{JUNK})$$

$$f'(x) = -\csc x \cot x$$

$$f'(x) = -\text{JUNK} \csc(\text{JUNK}) \cot(\text{JUNK})$$