

Problem 1

$$\frac{d}{dx} 9^{17}$$

Problem 1

$$\frac{d}{dx} 9^{17} = 0$$

Problem 2

$$\frac{d}{dx} \sqrt{y}$$

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$$\frac{d}{dx} \sqrt{y} = 0$$

Problem 3

$$\frac{d^2}{dx^2} \sin x$$

Problem 3

$$\frac{d^2}{dx^2} \sin x = -\sin x$$

Problem 4

$$\frac{d^{99}}{dx^{99}} \cos x$$

Problem 4

$$\frac{d^{99}}{dx^{99}} \cos x = \sin x$$

Problem 5

Suppose $f(5) = 1$, $f'(5) = 9$, $g(5) = -2$, and $g'(5) = 5$. Find...

$$(fg)'(5) =$$

$$\left(\frac{f}{g}\right)'(5) =$$

$$(f^2)'(5) =$$

$$\left(\frac{f}{g^2}\right)'(5) =$$

Problem 5

Suppose $f(5) = 1$, $f'(5) = 9$, $g(5) = -2$, and $g'(5) = 5$. Find...

$$(fg)'(5) = 9 \cdot (-2) + 1 \cdot 5 = -13$$

$$\left(\frac{f}{g}\right)'(5) = \frac{-2 \cdot 9 - 5 \cdot 1}{(-2)^2} = -\frac{23}{4}$$

$$(f^2)'(5) = 2 \cdot 1 \cdot 9 = 18$$

$$\left(\frac{f}{g^2}\right)'(5) = \frac{(-2)^2 \cdot 9 - 2 \cdot (-2) \cdot 5 \cdot 1}{(-2)^4} = \frac{7}{2}$$

Problem 6

$$\frac{d^{123}}{dx^{123}} x e^x$$

Problem 6

$$\frac{d^{123}}{dx^{123}} x e^x = x e^x + 123 e^x$$

Problem 7

If the equation of motion of a car is given by $s(t) = 2t^2 + t - 4$, find the velocity and acceleration functions.

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$$\text{Position: } s(t) = 2t^2 + t - 4$$

$$\text{Velocity: } s'(t) = 4t + 1$$

$$\text{Acceleration: } s''(t) = 4$$

Problem 8

Find the equation of the tangent line of $f(x) = \frac{x^2 - 1}{x^2 + x + 1}$ at $x = 1$.

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$$f'(x) = \frac{(x^2 + x + 1)(2x) - (x^2 - 1)(2x + 1)}{(x^2 + x + 1)^2} \Big|_{x=1} = \frac{6}{3^2} = \frac{2}{3}$$

$$f(1) = \frac{1 - 1}{3} = 0$$

$$y = y_0 + m(x - x_0)$$

$$y = 0 + \frac{2}{3}(x - 1)$$

$$y = \frac{2x - 2}{3}$$

Questions?