DIFFERENTIATION FORMULAS

DIFFERENTIAL CALCULUS

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TOPIC OUTLINE

Differentiation Formulas

- Constant Function Rule
- Power Rule
- Constant Multiple Rule
- Sum and Difference Rule
- Product Rule
- Quotient Rule

DIFFERENTIATION FORMULAS

CONSTANT FUNCTION RULE

Determine the derivative of $y = 5$.

$$\frac{d}{dx}(c) = 0$$

Differentiate the function $z = 1000$.

POWER RULE

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

Determine the derivative of $y = x^4$.

Differentiate the function $q = t^{-7}$.

CONSTANT MULTIPLE RULE

$$\frac{d}{dx}[cf(x)] = c\frac{d}{dx}f(x)$$

Determine the derivative of $y = 3x^4$.

Differentiate the function $m = 5n^{-3}$.

SUM AND DIFFERENCE RULE

$$\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx}f(x) + \frac{d}{dx}g(x)$$

$$\frac{d}{dx}[f(x) - g(x)] = \frac{d}{dx}f(x) - \frac{d}{dx}g(x)$$

Determine the derivative of $q = t^3 + t^{-2} - 2t^5$.

Differentiate the function

$y = 8x^7 + 60x^4 - 16x^3 + 30x^2 - 6.$

PRODUCT RULE

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}g(x) + g(x)\frac{d}{dx}f(x)$$

Determine the derivative of $y = 2x^2x^3$.

Differentiate the function $a = b^2\sqrt{b}$.

QUOTIENT RULE

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}f(x) - f(x)\frac{d}{dx}g(x)}{[g(x)]^2}$$

Determine the derivative of $y = \frac{x^2}{x+1}$.

Differentiate the function $v = \frac{w^2+1}{w+2}$.

EXERCISE

Differentiate the function $y = x^{-3}$.

Solution

EXERCISE

If $y = \sqrt{x}$, find y'.

Solution

EXERCISE

If $y = \frac{1}{x}$, find y'.

Solution

EXERCISE

Differentiate the function $y = 6x^3 7x^4$.

Solution

EXERCISE

Differentiate the function $y = x^{3/2}x^4$.

Solution

EXERCISE

Differentiate the function $y = \sqrt{x}\,(x - 1)$.

Solution

EXERCISE

Differentiate the function $y = \frac{x^2+x-2}{x^3+6}$.

Solution

EXERCISE

Find the slope of the tangent line to the curve

$y = \frac{\sqrt{x}}{1+x^2}$ at the point $\left(1, \frac{1}{2}\right)$.

Solution

EXERCISE

Differentiate the function $s = \sqrt{p} - p$.

Solution

EXERCISE

Differentiate the function $v = \left(\sqrt{x} + \frac{1}{\sqrt[3]{x}}\right)^2$.

Solution

EXERCISE

Find the slope of a tangent line to the curve

$y = \frac{2x}{x+1}$ at the point $(1, 1)$.

Solution

LABORATORY