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DERIVATIVE OF A PRODUCT. DERIVATIVE OF A QUOTIENT

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Abstract
This article discusses rules of finding an increase in the number of calcification and division of the unit. For the product of the product, the application of the Leibertic Rule and in the range of the department is explained by the division of the division, and the division of the department is explained. Theoretical foundations of both rule and practical examples are aimed at being beneficial for those who study students and mathematics.

Keywords: Derivatives, doions, divisions, differential, leiberhnits, relative facts, math analyzes, function.

Introduction

Calculation of the product of functions in mathematical analysis is one of the important and practical issues in science. Finding the product of multiplied and division forms is widely used in many sectors, physics, economics and technical. rule of leibernits shall be used in the finding the derivation of the department, while calculating the product of the multipole issue. It plays an important role in this rule and the deep absorption of formulas, working with complex functions. Therefore, it is planned to cover the theoretical foundations of multiplied and division and division of divisions, coverage with their proof examples.

The product of the multiplier. If the functions are different, the product of their multiplied multiplication is determined by the following formula:
(f(x) \cdot g(x))' = f'(x) \cdot g(x) + f(x) \cdot g'(x)
This is the rule of leiberhnits, that is, the product of the first function is multiplied with the second function, then the first feature is multiplied by the product of the

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Second Function and the sum of the results is obtained.Example:$f(x) = x^2, \quad g(x) = \sin(x)$

$(f(x) \cdot g(x))' = (x^2)' \cdot \sin(x) + x^2 \cdot (\sin(x))'= 2x \cdot \sin(x) + x^2 \cdot \cos(x)$

The product of the division. If and different, the product of their ratio is as follows:

$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$

This formula is called differentialization compartment rule.

Example:

$f(x) = x^2, \quad g(x) = x + 1$

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

Most multiplacts and division of division are used in solving many real life issues, such as in the finding speed and acceleration, economic modeling, and many other areas. Calcular use of them allows you to analyze the complex functional relationship.

A generalized form of the product's product. If the multiplication is more than two functions, their product is redeemed in the following form:

$(f(x) \cdot g(x) \cdot h(x))' = f'(x) \cdot g(x) \cdot h(x) + f(x) \cdot g'(x) \cdot h(x) + f(x) \cdot g(x) \cdot h'(x)$

The product of each function is obtained here and the remaining functions are multiplied by him.

$f(x) = x, \quad g(x) = \sin(x), \quad h(x) = e^x$

$(x \cdot \sin(x) \cdot e^x)' = 1 \cdot \sin(x) \cdot e^x + x \cdot \cos(x) \cdot e^x + x \cdot \sin(x) \cdot e^x= \sin(x) e^x + x \cos(x) e^x + x \sin(x) e^x$

Unique situations of the division of divisionIf the function is as follows:$y = \frac{1}{g(x)}$

In that case its derivative:$y' = -\frac{g'(x)}{(g(x))^2}$

Example:$y = \frac{1}{x^2 + 1}, \quad y' = -\frac{2x}{(x^2 + 1)^2}$

These formulas are used in physics, for the power of electricity, and many other process models.

Graphic interpretation. Graphically analyzing the product or division of functions is important in determining the interval of growth or decrease. For example:

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If the growing, decrease, then the importance of the positive or negativity will depend on the speed of change.Through the graphical analysis:

- zero pots (Points that are equal to 1.0),
- maximum / minimum points,
- The range of change is determined (function growing or decreasing).
- This approach is very useful in showing changes in physical quantities.

Connection with composite functions.
Features in the form of authentic or division are often found in conjunction with composite (complex) functions. In such cases, along with the chain rule (ruling rules), together, multiplication / division is required.mail:

$$y = \frac{\ln(x^2 + 1)}{x}$$

With the derivislery of the department, it is necessary to obtain composite function - product:

$$y' = \frac{\left(\frac{2x}{x^2 + 1}\right) \cdot x - \ln(x^2 + 1) \cdot 1}{x^2}= \frac{\frac{2x^2}{x^2 + 1} - \ln(x^2 + 1)}{x^2}$$

Such examples can help students understand the learning techniques deeper.

Conclusion

Finding the product and division of the unit is one of the main and practical directions of differential account. With the help of these regions, it will be possible to analyze complex functions, to identify their growth, decrease and extremum points. Especially through the commercial product, the rules of Leiberdits, and in the division of special formulas, many physical, economic and technical issues can be solved.
In practice, these rules are widely used in a mathematical modeling of real life. The deep study of this topic and shapes the necessary knowledge and skills necessary for students and researchers in the deep study of this theme.

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