A. What Are All The Zeros Of The Function G(x)=2x-3x-x-6 ?

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Understanding the zeros of a function is a fundamental concept in algebra and calculus. In this article, we will explore in detail what the zeros of the function G(x) = 2x - 3x - x - 6 are, how to find them, and why they are important. Whether you're a student encountering this topic for the first time or someone looking to deepen your understanding, this comprehensive guide will clarify every aspect related to the zeros of this particular function.

Introduction to Zeros of a Function

What is a Zero of a Function?

A zero of a function, also called a root or solution, is a value of x for which the function's output is zero. In mathematical terms:

- If G(x) is a function, then x = a is a zero of G(x) if G(a) = 0.

Finding zeros is crucial because they often correspond to solutions of equations, points where a graph intersects the x-axis, and critical points for understanding the behavior of the function.

Why Are Zeros Important?

Zeros provide insights into:

- The graph of the function: zeros indicate where the function crosses the x-axis.
- Solving equations: zeros are solutions to the equation G(x) = 0.
- Analyzing the function's behavior: zeros can be local minima, maxima, or points of inflection.

Analyzing the Given Function G(x) = 2x - 3x - x - 6

Step 1: Simplify the Function

Before finding zeros, it's essential to simplify the function to its most basic form. The given function is:

G(x) = 2x - 3x - x - 6

Let's combine like terms:

- Combine the x-terms: 2x - 3x - x
- 2x - 3x = -x
- -x - x = -2x

Therefore, the simplified form of G(x) is:

G(x) = -2x - 6

Step 2: Recognize the Type of Function

The simplified function:

G(x) = -2x - 6

is a linear function, which is a straight line when graphed. Its general form is:

G(x) = mx + b

where m is the slope, and b is the y-intercept.

In our case:

- Slope (m) = -2
- Y-intercept (b) = -6

Understanding that the function is linear simplifies the process of finding zeros.

How to Find All Zeros of G(x) = -2x - 6

Step 1: Set the Function Equal to Zero

To find the zeros, set G(x) = 0:

-2x - 6 = 0

Step 2: Solve for x

Rearranging the equation:

-2x = 6

Divide both sides by -2:

x = 6 / -2

x = -3

Result:

The only zero of the function $G(x) = -2x - 6$ is at:

$x = -3$

Interpreting the Zero of G(x)

Graphical Interpretation

Graphing the function $G(x) = -2x - 6$ results in a straight line with a slope of -2 and a y-intercept at -6. The zero at $x = -3$ indicates the point where the line crosses the x-axis.

Significance of the Zero

At $x = -3$, $G(x) = 0$, meaning:

$G(-3) = -2(-3) - 6 = 6 - 6 = 0$

This confirms our solution's correctness.

Additional Considerations in Zero-Finding

Multiple Zeros

In linear functions like this, there is only one zero unless the function is constant zero everywhere.

Zero of More Complex Functions

For quadratic, cubic, or higher-degree polynomials, finding zeros involves factoring, completing the square, or applying formulas such as the quadratic formula.

Factoring and Solving Techniques

While our function is linear, understanding other methods is useful for more complex functions.

Factoring

For polynomial functions, zeros can often be found by factoring the polynomial expression.

Quadratic Formula

For quadratic functions of the form ax^2 + bx + c = 0, zeros can be found using:

x = [-b ± √(b^2 - 4ac)] / (2a)

Summary of the Zero of G(x) = 2x - 3x - x - 6

- The simplified form of the function is G(x) = -2x - 6.
- The zero of the function is at x = -3.
- Setting G(x) = 0 and solving for x yields the zero.
- The zero indicates the point where the graph of G(x) crosses the x-axis.
- For linear functions, there is only one zero unless the function is constant zero everywhere.

Practical Applications of Finding Zeros

Understanding zeros is vital in various real-world contexts:

- **Physics:** Zeros can represent equilibrium points in motion or forces.
- **Economics:** Break-even points where profit or loss is zero.
- **Engineering:** Points where system responses cancel out.
- **Mathematics and Data Analysis:** Roots of equations used in modeling and forecasting.

Conclusion

In conclusion, the zeros of the function G(x) = 2x - 3x - x - 6 are essential for understanding the behavior of the function. After simplifying the function to G(x) = -2x - 6, we find that the only zero occurs at x = -3. Recognizing the process of setting the function equal to zero and solving for x is fundamental in algebra and aids in graphing, solving equations, and analyzing functions across various fields. Mastering the concept of zeros empowers students and professionals to interpret and utilize functions effectively in both theoretical and applied contexts.

Frequently Asked Questions

What is the simplified form of the function G(x)=2x - 3x - x - 6?

The simplified form of G(x) is -2x - 6.

How do I find the zeros of the function G(x)=2x - 3x - x - 6?

First, simplify the function, then set it equal to zero and solve for x: -2x - 6 = 0.

What is the value of x when G(x)=0 for the given function?

Solving -2x - 6 = 0 gives x = -3.

Are there multiple zeros for the function G(x)=2x - 3x - x - 6?

No, after simplification, there is only one zero at x = -3.

Is the zero of G(x) = -3 an intercept? Which one?

Yes, it is the x-intercept of the function.

How does simplifying the function help in finding its zeros?

Simplifying reduces the function to a linear form, making it easier to solve for zeros accurately.

Can the zeros of the function be complex numbers?

No, since the simplified function is linear, it has only one real zero at x = -3.

What is the importance of identifying all zeros of a function?

Zeros of a function are the points where the function crosses the x-axis, important for graphing and understanding its behavior.

What is the domain of the function G(x)=2x - 3x - x - 6?

The domain is all real numbers, since it's a polynomial function with no restrictions.

Additional Resources

A. What Are All The Zeros Of The Function G(x)=2x-3x-x-6 ?

Understanding the roots, or zeros, of a function is fundamental in algebra and calculus, as they reveal the points where the function intersects the x-axis. In this article, we will explore the process of finding all zeros of the specific function G(x)=2x−3x−x−6. By breaking down the steps involved, examining the algebraic manipulations, and interpreting the results, we aim to provide a clear, comprehensive guide suitable for learners and enthusiasts alike.

Introduction to the Concept of Zeros in Functions

Before diving into the specific function, it's essential to understand what zeros (or roots) of a function are and why they matter. In mathematical terms, a zero of a function G(x) is any value of x that makes G(x) equal to zero. Graphically, these are the points where the graph of the function crosses or touches the x-axis.

For example, if G(x) = 0 at x = a, then 'a' is called a zero of G. The process of finding zeros involves solving the equation G(x) = 0. This process can vary in complexity depending on the degree of the polynomial and the structure of the function.

Analyzing the Given Function G(x)=2x−3x−x−6

Let's begin by carefully examining the function provided:

$G(x) = 2x - 3x - x - 6$

At first glance, this appears to be a linear combination of terms involving x, along with a constant. However, it's crucial to clarify how the terms are combined—are there any parentheses, or is there potential for simplification? The expression as written suggests a straightforward algebraic combination.

Step 1: Simplify the Function

The initial step in finding zeros involves simplifying the function to its most straightforward form.

$G(x) = 2x - 3x - x - 6$

Let's combine like terms involving x:

- 2x, −3x, and −x are all like terms.

Calculating step by step:

- $2x - 3x = -x$
- Then, $-x - x = -2x$

So, the simplified form of G(x) is:

G(x) = -2x − 6

This simplification makes the process of solving for zeros much clearer.

Step 2: Set the Function Equal to Zero

To find the zeros, we set G(x) to zero:

-2x − 6 = 0

Now, solve for x.

Solving for the Zeros of G(x)

With the simplified function, the process is straightforward.

Step 3: Isolate x

Starting with:

-2x − 6 = 0

Add 6 to both sides:

-2x = 6

Divide both sides by -2:

x = 6 / -2

x = -3

Interpreting the Result

The solution x = -3 indicates that the function G(x) crosses the x-axis at x = -3. This single point is the zero of the function.

Since G(x) is a linear function, it has only one zero, which is consistent with the degree of the polynomial (degree 1).

Summary of Findings

To encapsulate the process:

- The original function G(x) was given as $2x - 3x - x - 6$.
- Simplifying led to G(x) = $-2x - 6$.
- Setting G(x) to zero and solving for x yielded x = -3.
- Therefore, the only zero of the function G(x) is at x = -3.

Additional Insights and Considerations

While this particular function is linear and has a single zero, the same principles extend to higher-degree polynomials, though the solution process can become more complex.

Key points to remember:

- Always simplify the function first to its most manageable form.
- Set the simplified function equal to zero to find zeros.
- Solve algebraically, considering the degree and nature of the polynomial.
- For quadratic or higher-degree functions, methods such as factoring, completing the square, or quadratic formula may be necessary.

Example of extension:

Suppose you encounter a quadratic function like G(x) = ax^2 + bx + c. Finding zeros involves solving ax^2 + bx + c = 0, which could be done via:

- Factoring (if factorable),
- Completing the square,
- Applying the quadratic formula: x = [-b ± sqrt(b^2 - 4ac)] / 2a.

Conclusion: The Significance of Zeroes in Function Analysis

Identifying all zeros of a function like $G(x)=2x-3x-x-6$ provides critical insights into its behavior, graph, and applications. For the function in question, the zero at x = -3 marks the point where the graph intersects the x-axis, offering a visual cue of the function's behavior.

Understanding the process of simplifying functions, setting them to zero, and solving algebraically is a foundational skill in mathematics. These techniques underpin more advanced topics, including calculus, differential equations, and applied mathematics.

In summary, the zero of $G(x) = -2x - 6$ is $x = -3$, and this single zero fully characterizes the root structure of this linear function. Recognizing these roots allows mathematicians, engineers, and scientists to interpret and utilize functions effectively across various disciplines.

Final note: Always double-check the algebraic manipulations and ensure that the original function is correctly interpreted, especially when dealing with more complex expressions. Mastery of these fundamental steps paves the way for tackling more intricate mathematical problems with confidence.

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