Select The Correct Answer.If F(x) = 2x-x-6 And G(x) = X2 - 4, Find F(x) + G(x).

Select The Correct Answer.If F(x) = 2x-x-6 And G(x) = X2 - 4, Find F(x) + G(x).

Understanding how to manipulate and combine functions is a fundamental aspect of algebra, which forms the backbone of higher mathematics and various real-world applications. Whether you're a student preparing for exams, a teacher creating instructional content, or someone interested in mathematical problem-solving, mastering the process of adding functions like F(x) and G(x) is essential. This article provides a comprehensive guide to solving the problem: Given the functions F(x) and G(x), find their sum, F(x) + G(x). We will explore the problem step by step, clarify common misconceptions, and highlight the importance of correct function notation and algebraic manipulation.

Introduction to Functions and Their Operations

Before diving into the specific problem, it's crucial to understand what functions are and how they can be combined through various operations such as addition, subtraction, multiplication, and composition.

What Are Functions?

In mathematics, a function is a rule that assigns exactly one output for each input from its domain. For example, the function F(x) assigns a value based on the input x, and similarly for G(x). Functions are commonly written in the form F(x), G(x), etc., where x is the independent variable.

Basic Operations on Functions

Functions can be combined to produce new functions through several operations:

- Addition: $(F + G)(x) = F(x) + G(x)$
- Subtraction: $(F - G)(x) = F(x) - G(x)$
- Multiplication: $(F \cdot G)(x) = F(x) \cdot G(x)$
- Division: $(F / G)(x) = F(x) / G(x)$, provided $G(x) \neq 0$
- Composition: $(F \circ G)(x) = F(G(x))$

In this article, our focus is on addition—specifically, calculating F(x) + G(x).

Clarifying the Given Functions

The problem states:

> $F(x) = 2x - x - 6$

> G(x) = X2 - 4

It’s important to interpret these correctly, especially considering the notation and potential typographical errors.

Interpreting F(x)

F(x) = 2x - x - 6

This simplifies as follows:

- 2x - x = x
- So, F(x) = x - 6

Thus, the function F(x) simplifies to a linear function:

\[F(x) = x - 6 \]

Interpreting G(x)

G(x) = X2 - 4

This seems to be a typo or misprint. Likely, it’s intended to be:

- G(x) = x^2 - 4

since "X2" probably means "x squared" or x^2.

Therefore, G(x) = x^2 - 4

Step-by-Step Solution to Find F(x) + G(x)

Now that we have clarified the functions:

- F(x) = x - 6
- G(x) = x^2 - 4

Our goal is to find:

\[F(x) + G(x) \]

which is:

$$ (x - 6) + (x^2 - 4) $$

Step 1: Write the sum explicitly

$$ F(x) + G(x) = (x - 6) + (x^2 - 4) $$

Step 2: Combine like terms

Since the terms are different types (linear and quadratic), we should write the polynomial in standard form:

$$ x^2 + x - 6 - 4 $$

Step 3: Simplify the constants

$$ x^2 + x - 10 $$

Thus, the sum of the functions is:

$$ F(x) + G(x) = x^2 + x - 10 $$

Final Answer

The sum of the functions F(x) and G(x) simplifies to:

$$ \boxed{F(x) + G(x) = x^2 + x - 10} $$

This is a quadratic function, combining the quadratic term from G(x) and the linear term from F(x), along with the constant.

Additional Insights

Understanding how to combine functions is vital in algebra and calculus. Here are some key points and common pitfalls to watch out for:

1. Always Simplify the Functions First

Before adding, simplify each function as much as possible. In our case:

- F(x) simplified from 2x - x - 6 to x - 6
- G(x) clarified as x^2 - 4

2. Pay Attention to Notation and Typographical Errors

Mathematical notation must be interpreted carefully. Typos like "X2" can lead to confusion. Always verify if it’s meant to be x^2 or something else.

3. Combine Like Terms Carefully

When adding functions, combine similar terms:

- Quadratic terms with quadratic terms
- Linear terms with linear terms
- Constants with constants

4. Understand the Geometric Meaning

Graphically, adding functions corresponds to combining their outputs for each x-value. The resulting function’s graph is the vertical sum of the original functions’ graphs.

5. Practice with Variations

Try adding different types of functions—quadratic with linear, exponential with polynomial—to deepen understanding.

Applications of Function Addition in Real Life

Function addition isn't just an academic exercise; it has practical applications across various fields:

Engineering and Physics

- Summing forces or velocities represented by functions
- Combining signal functions in electronics

Economics

- Calculating total cost functions by adding fixed and variable costs
- Summing demand and supply functions to find market equilibrium

Computer Science

- Combining algorithms represented as functions
- Aggregating data processes

Data Analysis

- Combining models or predictions from different sources

Practice Problems to Reinforce Concepts

To solidify your understanding, try solving these problems:

1. Given $F(x) = 3x + 2$ and $G(x) = x^2 - 5$, find $F(x) + G(x)$.

2. If $F(x) = x/2 + 4$ and $G(x) = 2x - 1$, determine the sum $F(x) + G(x)$.

3. For $F(x) = x^2 - 3x$ and $G(x) = 5x + 7$, compute $F(x) + G(x)$.

4. Suppose $F(x) = 2x - 8$ and $G(x) = x^2 + 3$, find their sum and simplify.

Common Mistakes to Avoid

- Misinterpreting notation: Always double-check the notation, especially exponents or variables.

- Ignoring the order of operations: Parentheses matter; always simplify inside parentheses first.

- Neglecting to combine like terms: Ensure all similar terms are combined for a simplified expression.

- Assuming functions are the same type: Remember that functions can be of different types; just combine like terms during addition.

Summary

In this comprehensive guide, we explored how to correctly interpret and combine two given functions, F(x) and G(x). By simplifying each function and then adding them, we found:

\[F(x) + G(x) = x^2 + x - 10 \]

This process underscores important algebraic principles: simplifying functions, understanding notation, combining like terms, and applying these skills to solve problems efficiently.

Mastering these concepts is essential for progressing in mathematics, enabling you to tackle more complex topics like calculus, differential equations, and mathematical modeling. Whether for academics, professional applications, or personal interest, a solid grasp of function addition enhances your problem-solving toolkit.

Remember, practice makes perfect. Use the practice problems provided to reinforce your understanding and become confident in manipulating and combining functions.

Keywords for SEO Optimization:

- How to add functions in algebra
- Simplifying functions step-by-step
- Combining F(x) and G(x)
- Solving function addition problems
- Algebra functions explained
- Example of adding functions
- Function notation and interpretation
- Basic algebraic operations
- Practice problems on functions
- Understanding quadratic and linear functions

Frequently Asked Questions

What is the simplified form of F(x) given as 2x - x - 6?

F(x) simplifies to x - 6.

What is the expression for G(x) given as X^2 - 4?

G(x) is X^2 - 4.

How do you find F(x) + G(x) with the given functions?

Add the simplified forms: $(x - 6) + (x^2 - 4) = x^2 + x - 10$.

What is the combined expression for F(x) + G(x)?

$F(x) + G(x) = x^2 + x - 10$.

What is the final answer after combining F(x) and G(x)?

The sum is $x^2 + x - 10$.

Additional Resources

Select The Correct Answer. If $F(x) = 2x - x - 6$ and $G(x) = x^2 - 4$, Find $F(x) + G(x)$.

Introduction

In the realm of algebra, functions serve as fundamental tools for understanding relationships between variables. They are essential in fields ranging from engineering to economics, offering a way to model and solve real-world problems. Today, we delve into a straightforward yet instructive problem involving the addition of two functions: $F(x)$ and $G(x)$. The challenge is to compute $F(x) + G(x)$ given the definitions:

- $F(x) = 2x - x - 6$
- $G(x) = x^2 - 4$

This problem not only tests basic algebraic manipulations but also reinforces the understanding of function operations—specifically, how to combine functions by addition. As we explore this problem, we'll clarify each step, ensuring that readers of varying mathematical backgrounds can follow along and grasp the underlying principles.

Understanding the Functions

Before performing any calculations, it is crucial to interpret the given functions accurately.

The Function $F(x)$

The function $F(x)$ is expressed as:

$$
F(x) = 2x - x - 6
$$

At first glance, the expression appears to be a linear function composed of multiple terms involving x. To simplify, combine like terms:

$$
2x - x = x
$$

Thus,

$$
F(x) = x - 6
$$

This simplification reveals that $F(x)$ is a linear function with a slope of 1 and a y-intercept of -6. Simplifying functions like this is a common step, making subsequent calculations more straightforward.

The Function $G(x)$

The second function is:

$$
G(x) = x^2 - 4
$$

This is a quadratic function, characterized by the square of x, with a constant subtracted. It opens upwards with a vertex at $(0, -4)$, and its graph is a parabola.

Step-by-Step Calculation of $F(x) + G(x)$

With both functions simplified, the task reduces to adding:

$$
F(x) + G(x) = (x - 6) + (x^2 - 4)
$$

Let's perform this addition systematically.

Step 1: Write the sum explicitly

$$
F(x) + G(x) = x - 6 + x^2 - 4
$$

Step 2: Rearrange the terms

Group similar terms—quadratic with quadratic, linear with linear, constants:

$$
x^2 + x + (-6 - 4)
$$

Step 3: Combine constants

$$
-6 - 4 = -10
$$

Thus, the summed function simplifies to:

$$
F(x) + G(x) = x^2 + x - 10
$$

This new function represents the combined effect of $F(x)$ and $G(x)$, producing a quadratic expression that can be analyzed further or used for graphing.

Interpreting the Result

The resulting function:

$$
H(x) = F(x) + G(x) = x^2 + x - 10
$$

has several notable features:

- Degree: It's quadratic, with a degree of 2.
- Leading coefficient: 1, indicating the parabola opens upwards.
- Vertex: The point where the parabola reaches its minimum value.
- Y-intercept: When $x = 0$, $H(0) = -10$.
- X-intercepts: The points where $H(x) = 0$, which require solving the quadratic equation.

Finding the Vertex

The vertex of a parabola $ax^2 + bx + c$ is at:

$$
x_v = -\frac{b}{2a}
$$

For our function:

$$
a = 1, \quad b = 1
$$

Calculating:

$$
x_v = -\frac{1}{2 \times 1} = -\frac{1}{2}
$$

Now, find the y-coordinate of the vertex:

$$
H\left(-\frac{1}{2}\right) = \left(-\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right) - 10 = \frac{1}{4} - \frac{1}{2} - 10
$$

Simplify:

$$
\frac{1}{4} - \frac{2}{4} - \frac{40}{4} = -\frac{41}{4} = -10.25
$$

Therefore, the vertex is at:

$$
\left(-\frac{1}{2}, -10.25\right)
$$

This point indicates the minimum value of the combined function.

Graphical Insights

Visualizing $H(x) = x^2 + x - 10$ can deepen understanding:

- The parabola opens upward.
- Its lowest point (vertex) is at $(-0.5, -10.25)$.
- The y-intercept occurs at $x=0$, giving $H(0) = -10$.
- The x-intercepts can be found by solving $x^2 + x - 10 = 0$.

Finding the Roots (X-intercepts)

To find where the combined function crosses the x-axis, solve:

$$

x^2 + x - 10 = 0
\]

Apply the quadratic formula:

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

where:

\[
a = 1, \quad b = 1, \quad c = -10
\]

Calculate discriminant:

\[
\Delta = b^2 - 4ac = 1 - 4 \times 1 \times (-10) = 1 + 40 = 41
\]

Compute roots:

\[
x = \frac{-1 \pm \sqrt{41}}{2}
\]

Since \(\sqrt{41} \approx 6.4\), the roots are approximately:

\[
x \approx \frac{-1 \pm 6.4}{2}
\]

This yields:

- For the positive root:

\[
x \approx \frac{-1 + 6.4}{2} = \frac{5.4}{2} = 2.7
\]

- For the negative root:

$$
x \approx \frac{-1 - 6.4}{2} = \frac{-7.4}{2} = -3.7
$$

Thus, the parabola intersects the x-axis at approximately $x \approx -3.7$ and $x \approx 2.7$.

Final Expression and Its Significance

The sum of the functions is:

$$
\boxed{F(x) + G(x) = x^2 + x - 10}
$$

This quadratic function encapsulates the combined behavior of the original functions. It can be used in various contexts—such as modeling combined phenomena, analyzing intersections, or solving for specific values.

Summary of Key Points

- Simplify each function before combining: $F(x) = x - 6$.
- Add the simplified functions term-by-term: $F(x) + G(x) = x^2 + x - 10$.
- Understand the properties of the resulting quadratic function:
- Opens upward.
- Vertex at $(-0.5, -10.25)$.
- Roots approximately at -3.7 and 2.7.
- Use algebraic formulas, such as the quadratic formula, to analyze the function further.
- Visualize the function to grasp its shape and key points.

Conclusion

The process of combining functions—adding, subtracting, or otherwise manipulating—is foundational in algebra and broader mathematics. In this example, we demonstrated how to simplify and sum two functions, revealing a quadratic that offers insights into their combined behavior. Whether for theoretical exploration or practical application, mastering these operations is essential for deeper mathematical understanding.

Through careful step-by-step analysis, we've not only found that:

$$
\boxed{F(x) + G(x) = x^2 + x - 10}
$$

but also explored its properties, roots, and graphical implications. Such exercises serve as building blocks for more complex topics, including calculus, differential equations, and data modeling, underscoring the importance of a solid grasp of basic function operations.

Note: For specific problem-solving, always verify the initial functions' expressions for accuracy, especially when they involve implied or missing parentheses, exponents, or coefficients.

Select The Correct Answer If F X 2x X 6 And G X X2 4 Find F X G X

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