

Let $F(x)=x+4$ And $G(x)=x^2-x$. Find And Simplify The Expression. $(f+g)(-5)$

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Understanding how to evaluate and simplify composite functions is a fundamental aspect of algebra and mathematical analysis. In this article, we will explore the process step-by-step to find and simplify the expression $(f+g)(-5)$ given the functions $F(x)=x+4$ and $G(x)=x^2-x$. We will delve into the definitions, stepwise calculations, and the mathematical principles involved to ensure clarity and comprehensive understanding.

Understanding the Functions $F(x)$ and $G(x)$

Before diving into the problem, it's essential to understand the individual functions involved:

Definition of $F(x)$

- Formula: $F(x) = x + 4$
- Description: A linear function that adds 4 to the input value.
- Graph: A straight line with a slope of 1 and a y-intercept at (0, 4).

Definition of $G(x)$

- Formula: $G(x) = x^2 - x$
- Description: A quadratic function involving an x-squared term minus x.
- Graph: A parabola opening upwards with roots at $x=0$ and $x=1$.

What Does $(f+g)(-5)$ Mean?

This notation indicates the sum of two functions evaluated at a specific point:

$$(f+g)(-5) = F(-5) + G(-5)$$

In words:

1. First, evaluate $F(x)$ at $x = -5$.
2. Next, evaluate $G(x)$ at $x = -5$.
3. Finally, add the two results to get the value of $(f+g)(-5)$.

Step-by-Step Solution

Let's proceed with each step carefully.

Step 1: Calculate $F(-5)$

Using the formula for $(F(x))$:

$$\begin{aligned} &[\\ F(x) &= x + 4 \\ &] \end{aligned}$$

Substitute $(x = -5)$:

$$\begin{aligned} &[\\ F(-5) &= -5 + 4 = -1 \\ &] \end{aligned}$$

Step 2: Calculate $G(-5)$

Using the formula for $(G(x))$:

$$\begin{aligned} &[\\ G(x) &= x^2 - x \\ &] \end{aligned}$$

Substitute $(x = -5)$:

$$\begin{aligned} &[\\ G(-5) &= (-5)^2 - (-5) = 25 + 5 = 30 \\ &] \end{aligned}$$

Step 3: Add the results

Now, sum the two evaluated functions:

$$\begin{aligned} &[\\ (f + g)(-5) &= F(-5) + G(-5) = -1 + 30 = 29 \\ &] \end{aligned}$$

Thus, the simplified value of $((f+g)(-5))$ is 29.

Additional Insights: Why Understanding Function Addition Matters

Adding functions and evaluating at specific points is an essential skill that has applications across various fields such as physics, engineering, economics, and computer science. Here's why it matters:

- Composite functions: Combining functions allows modeling complex systems.
- Predictive analysis: Evaluating functions at specific points helps in predicting behaviors.
- Mathematical problem-solving: Developing proficiency in such evaluations enhances overall problem-solving skills.

General Approach to Similar Problems

When faced with similar problems involving the sum of functions, follow these steps:

1. Identify the functions involved: Write down their formulas.
2. Evaluate each function at the given point: Substitute the point into each function.
3. Add the results: Sum the individual evaluations to find the combined value.
4. Simplify: Perform arithmetic operations to obtain the simplest form.

Example Practice Problem

Suppose $(H(x) = 3x - 2)$ and $(K(x) = x^3 + x)$. Find and simplify $((H+K)(2))$.

Solution:

- $(H(2) = 3(2) - 2 = 6 - 2 = 4)$
- $(K(2) = 2^3 + 2 = 8 + 2 = 10)$
- $((H+K)(2) = 4 + 10 = 14)$

This approach can be adapted to a wide variety of problems involving function addition.

Conclusion

In summary, evaluating and simplifying the expression $((f+g)(-5))$ with the functions $(F(x) = x + 4)$ and $(G(x) = x^2 - x)$ involves straightforward

substitution and addition:

- $(F(-5) = -1)$
- $(G(-5) = 30)$
- $((f+g)(-5) = -1 + 30 = 29)$

Mastering these steps enhances your ability to handle composite functions, an essential skill in higher mathematics and real-world applications. Practice with different functions and points to build confidence and deepen your understanding of function operations and evaluations.

Frequently Asked Questions

What is the function definition for $F(x)$ and $G(x)$?

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

How do you find $(f + g)(x)$ for the given functions?

You add the functions: $(f + g)(x) = F(x) + G(x)$.

What is the value of $(f + g)(-5)$?

First, find $F(-5)$ and $G(-5)$, then add them together.

How do you evaluate $F(-5)$?

$F(-5) = -5 + 4 = -1$.

How do you evaluate $G(-5)$?

$G(-5) = (-5)^2 - (-5) = 25 + 5 = 30$.

What is the sum $(f + g)(-5)$?

Adding $F(-5)$ and $G(-5)$: $-1 + 30 = 29$.

What is the simplified value of $(f + g)(-5)$?

The simplified value is 29.

Can you generalize how to find $(f + g)(x)$ for any x ?

Yes, compute $F(x) + G(x)$ for any x .

Why is it important to evaluate functions at specific points?

Evaluating functions at specific points helps understand their values and behavior at those points.

What is the overall process to solve $(f + g)(-5)$?

Calculate each function at -5, then add the results: $F(-5) + G(-5) = -1 + 30 = 29$.

Additional Resources

Let $F(x)=x+4$ And $G(x)=x^2-x$. Find And Simplify The Expression. $(f+g)(-5)$

Understanding the process of combining functions and evaluating composite expressions is fundamental in algebra and calculus. The problem at hand involves two functions, $F(x) = x + 4$ and $G(x) = x^2 - x$, and asks us to compute and simplify the expression $(f+g)(-5)$. This task demonstrates how to work with the sum of functions and evaluate the resulting function at a specific point. Mastering such problems enhances problem-solving skills and deepens understanding of function operations, which are critical in advanced mathematics and real-world applications.

Understanding the Concept of Functions and Their Sum

Before diving into the calculations, it's important to clarify what it means to add two functions and evaluate the result at a specific point.

Functions Defined

- Function $F(x)$: This is a linear function represented by $F(x) = x + 4$. It takes an input x , adds 4, and outputs the result.
- Function $G(x)$: This is a quadratic function given by $G(x) = x^2 - x$. It takes an input x , squares it, then subtracts x .

Sum of Functions

- The sum of two functions F and G , denoted as $(f+g)(x)$, is defined as:
 $[$

$$(f+g)(x) = F(x) + G(x)$$

\]

- To find $(f+g)(x)$, simply add the expressions representing each function.

Step-by-Step Solution to Find $(f+g)(-5)$

The key steps involve:

1. Determining the combined function $(f+g)(x)$.
2. Substituting $x = -5$ into this combined function.
3. Simplifying the result to obtain a final answer.

Step 1: Find $(f+g)(x)$

Using the definitions provided:

\[

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

\]

Simplify:

\[

$$(f+g)(x) = x + 4 + x^2 - x$$

\]

Notice that x and $-x$ cancel out:

\[

$$(f+g)(x) = x^2 + 4$$

\]

Thus, the combined function simplifies to:

\[

$$(f+g)(x) = x^2 + 4$$

\]

Step 2: Evaluate $(f+g)(-5)$

Substitute $x = -5$ into the simplified function:

\[

$$(f+g)(-5) = (-5)^2 + 4$$

\]

Calculate:

\[

$$(-5)^2 = 25$$

\]

Add 4:

\[
25 + 4 = 29
\]

The value of $(f+g)(-5)$ is 29.

Features and Insights of the Solution

Understanding this process not only provides the numerical answer but also reinforces several key mathematical concepts:

- Linearity of addition: Combining functions involves straightforward algebraic addition of their expressions.
- Simplification skills: Combining like terms and canceling common elements streamline the expression.
- Substitution proficiency: Substituting specific values into simplified functions emphasizes the importance of accurate calculation.

Additional Considerations and Variations

While this problem is straightforward, exploring variations can deepen understanding:

1. Difference of Functions

- Instead of addition, consider $(f-g)(x) = F(x) - G(x)$ and evaluate at a point.
- This introduces subtraction, requiring careful handling of signs.

2. Composition of Functions

- Computing $(f \circ g)(x) = F(G(x))$ explores how functions combine through composition.
- Evaluating at specific points involves nested substitution.

3. More Complex Functions

- Introducing functions with higher degrees or different operations (e.g., roots, exponentials) can illustrate the versatility of these techniques.
- The approach remains similar: define, simplify, then evaluate.

Common Pitfalls and Tips for Success

While solving such problems, students should be aware of potential errors:

- Misinterpreting function notation: Remember that $(f+g)(x)$ means $(f(x) + G(x))$, not $(F(G(x)))$.
- Incorrect substitution: Double-check signs and calculations during substitution.
- Overlooking simplification opportunities: Always combine like terms to simplify expressions completely.

Tips:

- Write out each step clearly.
- Verify calculations at each stage.
- Practice with varied functions to build confidence.

Summary and Final Thoughts

The problem of finding $(f+g)(-5)$ with $F(x) = x + 4$ and $G(x) = x^2 - x$ exemplifies core algebraic skills involving function addition and evaluation. By carefully combining the functions, simplifying the resulting expression, and substituting the given value, we arrived at the answer 29. This process underscores the importance of understanding function operations, algebraic manipulation, and systematic problem-solving strategies. Such foundational skills serve as building blocks for more advanced topics in mathematics, including calculus, differential equations, and mathematical modeling.

Mastering these techniques enhances problem-solving efficiency and deepens mathematical intuition, making it easier to tackle complex real-world problems involving functions and their combinations. Whether dealing with simple linear functions or intricate compositions, the principles demonstrated here remain universally applicable, fostering a solid mathematical mindset essential for academic success and practical application.

In conclusion, the calculation of $(f+g)(-5)$ not only provides a specific numerical result but also reinforces essential mathematical concepts that are vital for progressing in mathematics and related fields.

Let $F(x) = x + 4$ And $G(x) = x^2 - x$ Find And Simplify The Expression F

G 5

Let $F(x) = 4x$ And $G(x) = 2x$ Find And Simplify The Expression $F(G(5))$

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