Find Each Value If F(x) = 5/(x + 2) And G(x) = - 2x + 3 F(3)a) 0b) 1c) -3d) 5

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

Find Each Value If F(x) = 5/(x + 2) And G(x) = - 2x + 3 F(3)a) 0b) 1c) -3d) 5. This problem involves evaluating two functions, F(x) and G(x), at specific points to find the corresponding output values. To do this effectively, it's essential to understand the definitions and properties of these functions. In this article, we will explore how to evaluate these functions step-by-step, analyze their behavior, and answer the specific questions posed in the problem.

Breaking Down the Functions

Function F(x): Rational Function

The function F(x) is defined as:

- **F(x) = 5 / (x + 2)**

This is a rational function, which means it involves a ratio of two polynomials. The denominator (x + 2) can never be zero because division by zero is undefined. Therefore, the domain of F(x) is all real numbers except x = -2.

Function G(x): Linear Function

The function G(x) is defined as:

- **G(x) = -2x + 3**

This is a linear function with a slope of -2 and a y-intercept of 3. It is defined for all real numbers, with no restrictions.

Evaluating F(3)

Step-by-step Calculation

Given that F(x) = 5 / (x + 2), to find F(3), substitute x = 3 into the function:

F(3) = 5 / (3 + 2) = 5 / 5 = 1

Therefore, **F(3) = 1**.

Calculating G(x) at Various Points

G(0)

- Substitute x = 0 into G(x):

G(0) = -2(0) + 3 = 0 + 3 = 3

Hence, **G(0) = 3**.

G(1)

- Substitute x = 1 into G(x):

G(1) = -2(1) + 3 = -2 + 3 = 1

Thus, **G(1) = 1**.

G(-3)

- Substitute x = -3 into G(x):

G(-3) = -2(-3) + 3 = 6 + 3 = 9

So, **G(-3) = 9**.

G(5)

- Substitute x = 5 into G(x):

G(5) = -2(5) + 3 = -10 + 3 = -7

Therefore, **G(5) = -7**.

Answering the Specific Questions

a) Find F(3) and compare it to the options provided

- As calculated, F(3) = 1
- This matches option **b) 1**.

b) Interpreting the options for F(3)

- Options given are: 0, 1, -3, 5.
- We determined F(3) = 1, so the correct choice is option **b) 1**.

c) Additional evaluations involving G(x)

- G(0) = 3
- G(1) = 1
- G(-3) = 9
- G(5) = -7

These evaluations help understand the behavior of G(x) at various points, which can be useful in broader contexts such as graphing or analyzing function intersections.

Understanding the Domain and Range of the Functions

Domain of F(x)

- F(x) is undefined where the denominator is zero.
- Set denominator equal to zero:

$x + 2 = 0 \Rightarrow x = -2$

- Therefore, the domain of F(x) is all real numbers except x = -2.

Range of F(x)

- As x approaches -2, F(x) approaches infinity or negative infinity.
- For large positive or negative x, F(x) approaches zero but never reaches it.
- Hence, the range is all real numbers except 0.

Domain and Range of G(x)

- G(x) is linear and defined for all real x.
- Range: all real numbers, since the line extends infinitely in both directions.

Graphical Representation of F(x) and G(x)

Graph of F(x)

The graph of F(x) is a hyperbola with a vertical asymptote at x = -2 and a horizontal asymptote at y = 0. As x approaches -2 from the left or right, F(x) tends to infinity or negative infinity. The graph is decreasing on both sides of the asymptote.

Graph of G(x)

The linear function G(x) is represented by a straight line crossing the y-axis at 3 and sloping downward with a slope of -2. The line extends infinitely in both directions.

Practical Applications and How to Use These Functions

Real-World Examples of F(x) and G(x)

- **F(x):** Could model inverse relationships, such as speed versus time under specific conditions, or rate problems where the rate diminishes as a variable increases.
- **G(x):** Commonly models linear relationships, such as profit per unit, temperature change over time, or linear depreciation.

Using Function Evaluations in Problem Solving

1. Identify the function and the point of interest.
2. Substitute the value into the function expression.
3. Compute carefully, considering domain restrictions.
4. Compare the result to options or interpret it in context.

Summary of Key Points

- F(x) = 5 / (x + 2) is a rational function with a vertical asymptote at x = -2 and a horizontal asymptote at y = 0.
- G(x) = -2x + 3 is a linear function with a domain of all real numbers.
- Evaluating F(3) yields 1, matching option b).
- Evaluating G(x) at various points helps understand its behavior and graph.
- Understanding domain and range is crucial for analyzing and graphing these functions effectively.

Conclusion

By carefully analyzing the definitions and properties of the functions F(x) and G(x), and methodically substituting values, we can accurately find their outputs at specific points. This approach not only helps solve the given problem but also enhances understanding of rational and linear functions. Whether working in academic settings or applying these concepts to real-world scenarios, mastering the evaluation of functions is fundamental in mathematics. Remember to always consider domain restrictions, especially for rational functions, and to interpret your results within the context of the problem.

Frequently Asked Questions

What is the value of F(3) if F(x) = 5/(x + 2)?

F(3) = 5/(3 + 2) = 5/5 = 1

What is the value of G(3) if G(x) = -2x + 3?

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

How do you find F(3) for the function F(x) = 5/(x + 2)?

Substitute x = 3 into the function: F(3) = 5/(3 + 2) = 5/5 = 1

What is the value of F(3) given F(x) = 5/(x + 2)?

F(3) = 1

Calculate G(3) for G(x) = -2x + 3.

G(3) = -3

What is F(3) when F(x) = 5/(x + 2)?

F(3) = 1

Determine the value of G(3) for the function G(x) = -2x + 3.

G(3) = -3

If F(x) = 5/(x + 2), what is F(3)?

F(3) = 1

Using the functions F and G, what is the value of F(3) and G(3)?

F(3) = 1, G(3) = -3

Additional Resources

Find Each Value If F(x) = 5/(x + 2) And G(x) = - 2x + 3 is a mathematical problem that offers an insightful exploration into function evaluation, substitution, and algebraic manipulation. This problem involves two functions, F(x) and G(x), and the task is to determine the value of F at specific inputs, especially when the input is related to G(x) or directly given. Such exercises are fundamental in understanding how functions behave and how to evaluate composite or related functions at particular points. This review will delve into the details of how to approach these calculations, analyze the steps involved, and discuss some broader concepts related to these functions, including their properties and potential applications.

Understanding the Given Functions

Before tackling the specific values, it is essential to comprehend the structure and nature of the functions involved.

Function F(x) = 5/(x + 2)

- Type: Rational function
- Domain: All real numbers except x = -2, where the denominator becomes zero
- Features:
- Asymptote at x = -2
- The function approaches infinity or negative infinity near the vertical asymptote
- When x is large positive or negative, F(x) approaches zero

Function G(x) = -2x + 3

- Type: Linear function
- Domain: All real numbers
- Features:
- Slope: -2 (indicating a decreasing line)
- Y-intercept: 3
- Straight line with predictable behavior

Understanding these functions' properties helps in evaluating their values at specified points and analyzing their behavior graphically and algebraically.

Methodology for Calculating the Values

The problem requires evaluating F at points related to the outputs of G(x) or at specific inputs: 0, 1, -3, and 5. The process involves:

- Substituting the given x-values into G(x) to find relevant inputs
- Using these inputs to evaluate F(x) directly
- In some cases, the x-values are given explicitly, so straightforward substitution is sufficient

The general approach can be summarized as:
1. Compute G(x) where necessary.
2. Use the resulting value as an input to F(x) if required.
3. For direct evaluations at specific points, substitute directly into F(x).

Calculations for Each Point

Let's analyze each given point step by step.

a) Find F(0)

- Step 1: Substitute x = 0 into F(x)
- Calculation:

F(0) = 5 / (0 + 2) = 5 / 2

- Result: F(0) = 2.5

Analysis:
- The value is straightforward since 0 is within the domain of F(x).
- No complications arise here, illustrating the simplicity of direct substitution in rational functions.

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b) Find F(1)

- Step 1: Substitute x = 1 into F(x)
- Calculation:

F(1) = 5 / (1 + 2) = 5 / 3

- Result: F(1) ≈ 1.6667

Analysis:
- Again, direct substitution works smoothly.
- The function behaves well at this point, with no asymptote issues.

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c) Find F(-3)

- Step 1: Substitute x = -3 into F(x)
- Calculation:

F(-3) = 5 / (-3 + 2) = 5 / (-1) = -5

Analysis:
- The value is negative, and the denominator is not zero, so the function is defined here.
- The calculation confirms the function's sign change depending on the input.

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d) Find F(5)

- Step 1: Substitute x = 5 into F(x)
- Calculation:

F(5) = 5 / (5 + 2) = 5 / 7

- Result: F(5) ≈ 0.7143

Analysis:
- The function value decreases as x increases in this region.
- The function remains well-defined for x = 5, with no asymptote issues at this point.

Integrating G(x) into the Evaluation

While the problem explicitly states the values of x for F(x), it also hints at potential evaluations involving G(x). For example, suppose the problem implicitly asks for F(G(x)), or to evaluate F at points where G(x) is relevant.

Suppose we interpret the problem as finding F at points determined by G(x). For instance, if x is replaced by G(x), then:

- G(0): G(0) = -2(0) + 3 = 3
- F(G(0)): F(3) = 5 / (3 + 2) = 5/5 = 1

Similarly, for other given points:

- G(1): G(1) = -2(1) + 3 = 1
- F(G(1)): F(1) = 5 / (1 + 2) = 5/3

- G(-3): G(-3) = -2(-3) + 3 = 6 + 3 = 9
- F(G(-3)): F(9) = 5 / (9 + 2) = 5/11

- G(5): G(5) = -2(5) + 3 = -10 + 3 = -7
- F(G(5)): F(-7) = 5 / (-7 + 2) = 5 / (-5) = -1

These calculations demonstrate how the functions can be composed or related, and how the evaluations change accordingly.

Broader Analysis and Insights

Understanding these functions and their evaluations provides several insights:

Features of the Functions

- F(x):
- Rational function with a vertical asymptote at x = -2
- Asymptotic behavior near x = -2, where the function tends toward infinity or negative infinity
- Horizontal asymptote at y = 0 for large |x|

- G(x):
- Linear function with a constant slope
- No restrictions on the domain
- Useful in modeling linear relationships

Evaluation Techniques

- Direct substitution is straightforward for rational functions at points where the denominator is not zero
- For composite functions, substitution must respect domain restrictions
- Graphical understanding enhances comprehension of asymptotic behavior and function trends

Potential Applications

- Rational functions like F(x) are common in physics (e.g., inverse square laws), engineering, and economics
- Linear functions like G(x) model relationships with constant rates
- Combining functions aids in modeling complex systems

Pros and Cons of the Approach

Pros:
- Clarity in step-by-step evaluation
- Reinforces understanding of function substitution
- Highlights the importance of domain considerations
- Demonstrates how to handle composed functions

Cons:
- Assumes familiarity with basic algebra and function properties
- Does not explore the graphical interpretations in depth
- Limited to specific points; broader analysis would include limits and asymptotic behavior

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Conclusion

The problem of finding specific values of F(x) and G(x) offers a rich learning experience in evaluating functions, understanding their properties, and applying algebraic techniques. Whether directly substituting values or composing functions, the process underscores the importance of domain awareness and systematic calculation. The exploration of these functions not only solidifies foundational skills but also provides a window into more advanced concepts like asymptotes, function composition, and behavior analysis. Such exercises are invaluable for students and practitioners alike, fostering a deeper appreciation of the elegance and utility of mathematical functions in various fields.

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