Find(f1)(a)forf(x)=35xwhena=1(Enter An Exact Answer.) Provide Your Answer Below:(f1)(1) = ____

Find(f1)(a)forf(x)=35xwhena=1(Enter An Exact Answer.) Provide Your Answer Below:(f1)(1) = ____

Understanding the Problem: Finding the Derivative of a Function at a Point

When working with functions in calculus, a common task is to find the derivative of a given function and evaluate it at a specific point. The notation f'(a) or (f1)(a) denotes the derivative of the function f(x) evaluated at the point x = a.

In this particular problem, we're asked to find (f1)(a) for the function f(x) = 35x when a = 1. This involves two main steps:
- First, differentiate the function f(x) = 35x to find f'(x).
- Second, evaluate this derivative at x = 1 to get f'(1).

Let's explore these steps in detail to understand how to arrive at the exact value.

Step 1: Differentiating the Function f(x) = 35x

Understanding the Function

The given function f(x) = 35x is a linear function. It represents a straight line with a slope of 35. Linear functions are among the simplest functions to differentiate because their derivatives are constants.

Applying Basic Differentiation Rules

- The derivative of ax, where a is a constant, with respect to x is simply a.
- Therefore, for f(x) = 35x, the derivative f'(x) is 35.

Result of Differentiation

\[
f'(x) = 35
\]

This derivative indicates that the slope of the function f(x) is constant at 35 everywhere; the rate of change of f(x) with respect to x does not depend on x.

Step 2: Evaluating the Derivative at x = 1

Substituting the Point of Interest

Since f'(x) = 35 for all x, evaluating at x = 1 simply involves substituting x = 1 into f'(x):

\[
f'(1) = 35
\]

Interpreting the Result

This means that at x = 1, the instantaneous rate of change of the function f(x) = 35x is exactly 35. This aligns with the intuition for a linear function, where the slope remains constant across all points.

Summary of the Solution

To summarize:
- The derivative of f(x) = 35x is f'(x) = 35.
- Evaluating at a = 1, we find f'(1) = 35.

Therefore, the exact answer for the problem is:

\[
\boxed{
(f1)(1) = 35
}
\]

Additional Insights on Derivatives and Linear Functions

Why is the derivative of a linear function a constant?

Linear functions, characterized by the form $f(x) = mx + b$, have a constant slope m. The derivative of such functions is simply that slope, because the rate of change between any two points on the line remains the same.

Implications of a Constant Derivative

- The derivative provides critical insight into the behavior of functions.
- For $f(x) = 35x$, the slope of 35 indicates that for every 1-unit increase in x, the function $f(x)$ increases by 35 units.
- The derivative being constant simplifies many calculus operations and helps in understanding the function's graph and rate of change.

Extensions and Applications

Real-World Contexts

Understanding derivatives of linear functions is foundational in fields like physics, economics, and engineering:
- In physics, a constant derivative corresponds to constant velocity.
- In economics, it could represent constant marginal cost or revenue.

Further Calculus Concepts

- Derivatives of more complex functions involve rules like the product rule, quotient rule, and chain rule.
- The concept of derivatives extends to higher-order derivatives, which describe acceleration or curvature.

Conclusion

In conclusion, finding the derivative of $f(x) = 35x$ at $a = 1$ is straightforward due to the simplicity of the function. Recognizing that the derivative of a linear function is the constant slope simplifies the process significantly. The exact answer to the question is:

\[
\boxed{
(f1)(1) = 35
}

\]

This process exemplifies fundamental principles in calculus and highlights the importance of derivatives in analyzing how functions change at specific points.

Frequently Asked Questions

What is the value of (f1)(1) for the function f(x) = 35x when a = 1?

35

How do you compute the inverse function (f1)(x) for f(x) = 35x?

To find the inverse, solve y = 35x for x: x = y/35, so (f1)(x) = x/35.

What is the value of (f1)(1) given f(x) = 35x?

Since (f1)(x) = x/35, (f1)(1) = 1/35.

If f(x) = 35x, what is the inverse function (f1)(x)?

(f1)(x) = x/35.

Calculate (f1)(a) for f(x) = 35x when a = 1.

The value is 1/35.

Is the inverse of f(x) = 35x a linear function? What is it?

Yes, the inverse is linear: (f1)(x) = x/35.

For the function f(x) = 35x, what does (f1)(1) equal?

It equals 1/35.

How do you verify that (f1)(x) = x/35 is the inverse of f(x) = 35x?

By composing: f((f1)(x)) = 35(x/35) = x and (f1)(f(x)) = (35x)/35 = x, confirming they are inverses.

What is the exact value of (f1)(1) for the function f(x) = 35x?

The exact value is 1/35.

Additional Resources

Understanding the Composition of Functions: A Deep Dive into Find(f_1)(a) for f(x) = 35x when a=1

Introduction

When faced with the task of evaluating the composition of functions, especially in the context of inverse functions, it's essential to understand the foundational concepts thoroughly. In this article, we will explore the process of finding f_1(a), which is typically denoted as the inverse function $f^{-1}(a)$, for the function:

$$
f(x) = 35x
$$

where $a=1$. Our goal is to compute the exact value of $f^{-1}(1)$. This involves understanding inverse functions, how to derive them, and applying the process step-by-step to arrive at an accurate, precise answer.

What is an Inverse Function?

Before delving into calculations, let's clarify what an inverse function is.

Definition:
An inverse function $f^{-1}(x)$ of a function $f(x)$ is a function that "undoes" the action of f. In other words, if:

$$
f(x) = y
$$

then

$$
f^{-1}(y) = x
$$

Key properties:

- The domain of f^{-1} is the range of f.
- The range of f^{-1} is the domain of f.
- The composition of a function and its inverse yields the original input:

$$
f(f^{-1}(x)) = x \quad \text{and} \quad f^{-1}(f(x)) = x
$$

Step 1: Understanding the Given Function $f(x) = 35x$

The function $f(x) = 35x$ is a simple linear function with a slope of 35 and zero intercept. Its characteristics include:

- Linearity: Straight line, continuous and differentiable everywhere.
- Injectivity: Since the slope is non-zero, it is one-to-one and thus invertible.
- Range and Domain:
- Domain: All real numbers $\mathbb{R}$ (assuming no restrictions).
- Range: All real numbers $\mathbb{R}$.

Step 2: Deriving the Inverse Function $f^{-1}(x)$

To find the inverse function, follow these methodical steps:

1. Replace $f(x)$ with y:

$$
y = 35x
$$

2. Switch x and y to reflect the inverse:

$$
x = 35y
$$

3. Solve for y:

$$
y = \frac{x}{35}
$$

4. Express the inverse function:

$$
f^{-1}(x) = \frac{x}{35}
$$

This inverse function takes any input x and returns the original x value before it was transformed by f.

Step 3: Evaluating $f^{-1}(a)$ at $a=1$

The specific task is to find:

$$
f^{-1}(1)
$$

Using our derived inverse:

$$
f^{-1}(1) = \frac{1}{35}
$$

Expert Analysis: Why is this the exact answer?

Because the inverse function is derived explicitly from the original linear function, and the evaluation involves straightforward substitution, the answer is exact and algebraically valid. There are no approximations or numerical methods involved.

Summary of Key Steps

Step	Action	Result
1	Write $f(x) = y$	$y = 35x$
2	Switch x and y	$x = 35y$
3	Solve for y	$y = \frac{x}{35}$
4	Write the inverse	$f^{-1}(x) = \frac{x}{35}$
5	Substitute $a=1$	$f^{-1}(1) = \frac{1}{35}$

Practical Implications and Applications

Understanding how to find inverse functions like $f^{-1}(a)$ is crucial in many fields, including:

- Mathematics and Education:
Fundamental for solving equations involving inverse relationships.
- Engineering:
Reversing transformations or signals.
- Computer Science:
Cryptography and data encoding often rely on invertible functions.
- Physics:
Reversing transformations in kinematics or other models.

Common Pitfalls to Avoid

- Confusing the inverse with reciprocal:
For linear functions, the inverse is not the reciprocal unless specifically formulated.

- Ignoring domain/range restrictions:
Although in this case, the functions are invertible over \(\mathbb{R}\), some functions are not invertible over restricted domains.
- Forgetting to switch variables:
The critical step in deriving the inverse function.

Conclusion

The process of finding \(f^{-1}(a)\) for the given linear function \(f(x)=35x\), especially at \(a=1\), is straightforward once the inverse function is derived explicitly. The final, exact answer to the question:

\[
\boxed{
f^{-1}(1) = \frac{1}{35}
}
\]

demonstrates the elegance of algebraic manipulation and the importance of understanding function inverses. Recognizing the inverse as a simple division by 35 allows for quick computations and deepens comprehension of the underlying mathematical structure. Whether in academic settings or practical applications, mastering this process is a vital tool in the problem-solving toolkit.

Find F1 A Forf X 35xwhena 1 Enter An Exact Answer Provide Your Answer Below F1 1

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