Inverse Functions Worksheet Answer Key PDF

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Part 1: Building a Foundation

What is the notation used to represent the inverse of a function \(f(x) \)?

undefined. A) \(f^2(x) \)

undefined. B) \(f^{-1}(x) \) ✓

undefined. C) \(\frac{1}{f(x)} \)

undefined. D) \(f'(x) \)

The correct notation for the inverse of a function is \(f^{-1}(x) \).

Which of the following statements are true about inverse functions?

undefined. A) The inverse of a function reverses the operation of the original function. ✓

undefined. B) A function must be one-to-one to have an inverse. ✓

undefined. C) The inverse of a function is always a function.

undefined. D) The graph of an inverse function is a reflection over the line \(y = x \). ✓

The true statements include that the inverse reverses the operation, must be one-to-one, and is a reflection over \(y = x \).

Explain the Horizontal Line Test and its significance in determining if a function has an inverse.

The Horizontal Line Test states that if any horizontal line intersects the graph of a function more than once, the function does not have an inverse.

List two conditions necessary for a function to have an inverse.

1. Condition 1

The function must be one-to-one.

2. Condition 2

The function must cover its range.

A function must be one-to-one and must cover its range to have an inverse.

If a function \(f(x) \) is increasing over its entire domain, what can be said about its inverse?

undefined. A) The inverse does not exist.
undefined. B) The inverse is also increasing. ✓
undefined. C) The inverse is decreasing.
undefined. D) The inverse is a constant function.

If \(f(x) \) is increasing, then its inverse \(f^{-1}(x) \) is also increasing.

Part 2: Application and Analysis

Given \(f(x) = 2x + 3 \), what is \(f^{-1}(x) \)?

undefined. A) \(\frac{x - 3}{2} \) ✓
undefined. B) \(2x - 3 \)
undefined. C) \(\frac{x + 3}{2} \)
undefined. D) \(2(x - 3) \)

The inverse function is found by solving the equation for \(x \), resulting in \(f^{-1}(x) = \frac{x - 3}{2} \).

Which of the following functions have inverses?

undefined. A) \(f(x) = x^2 \) over \(x \geq 0 \) ✓
undefined. B) \(f(x) = \sin(x) \) over \(-\frac{\pi}{2} \) \(\text{to} \) \(\frac{\pi}{2} \) ✓
undefined. C) \(f(x) = e^x \) ✓
undefined. D) \(f(x) = x^3 \) ✓

The functions that have inverses are those that are one-to-one, such as \(f(x) = x^2 \) over \(x \geq 0 \), \(f(x) = \sin(x) \) over \(-\frac{\pi}{2} \) to \(\frac{\pi}{2} \), \(f(x) = e^x \), and \(f(x) = x^3 \).

Solve for the inverse of the function \(f(x) = \frac{1}{x+1} \).

To find the inverse, set $y = \frac{1}{x+1}$ and solve for x, resulting in $f^{-1}(x) = \frac{1}{x} - 1$.

If $f(x) = \sqrt{x}$ and $g(x) = x^2$, are these functions inverses of each other?

undefined. A) Yes, because $f(g(x)) = x$ for all x.

undefined. B) No, because $g(f(x)) \neq x$ for all x. ✓

undefined. C) Yes, because both functions are one-to-one.

undefined. D) No, because $f(g(x)) \neq x$ for all x.

These functions are not inverses of each other because $g(f(x)) \neq x$ for all x.

Discuss the impact of restricting the domain of a function on its inverse. Provide an example.

Restrict the domain of a function to make it one-to-one, allowing it to have an inverse. For example, restricting $f(x) = x^2$ to $x \geq 0$ makes it one-to-one.

Part 3: Evaluation and Creation

Which of the following statements best evaluates the necessity of inverse functions in real-world applications?

undefined. A) Inverse functions are rarely used in practical scenarios.

undefined. B) Inverse functions are essential for solving equations and converting units. ✓

undefined. C) Inverse functions are only useful in theoretical mathematics.

undefined. D) Inverse functions complicate mathematical models unnecessarily.

Inverse functions are essential for solving equations and converting units in real-world applications.

Evaluate the following scenarios and identify where inverse functions are applicable:

undefined. A) Converting Celsius to Fahrenheit ✓

undefined. B) Calculating the original price from a discounted price ✓

undefined. C) Determining the time taken given speed and distance

undefined. D) Solving for the principal amount in compound interest ✓

Inverse functions are applicable in scenarios such as converting Celsius to Fahrenheit, calculating original prices from discounts, and solving for principal amounts in compound interest.

Create a real-world problem that involves finding the inverse of a function. Explain how you would solve it and the significance of the inverse in your scenario.

An example could be calculating the time it takes to travel a distance at a certain speed, where the inverse function helps determine the original speed from the time and distance.