Evaluate V(x)=12-2x-5.8 When X =-2,0, And 5

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Understanding how to evaluate functions at specific values of x is a fundamental skill in algebra and mathematics. In this article, we will explore the process of evaluating the function $V(x) = 12 - 2x - 5.8$ when x takes on the values -2, 0, and 5. This comprehensive guide aims to clarify the steps involved, provide detailed calculations, and highlight the importance of such evaluations in mathematical problem-solving and real-world applications.

Understanding the Function V(x) = 12 - 2x - 5.8

Before diving into the evaluation process, it's essential to understand the structure of the given function.

What is a Function?

A function is a relation between a set of inputs and permissible outputs with a rule that assigns each input exactly one output. In this case:

- The input variable is x.
- The output is $V(x)$.

Breaking Down the Function Components

The function $V(x) = 12 - 2x - 5.8$ consists of:

- A constant term: 12
- A variable term: $-2x$
- A constant term: -5.8

This is a linear function, which means its graph will be a straight line when plotted.

Simplifying the Function

It's often helpful to simplify the function before evaluation:

$$
V(x) = 12 - 2x - 5.8
$$

$$
V(x) = (12 - 5.8) - 2x
$$

$$
V(x) = 6.2 - 2x
$$

Simplified, the function is:

$$
V(x) = 6.2 - 2x
$$

This simplification makes the evaluation process more straightforward.

Steps to Evaluate V(x) for Given Values of x

Evaluating a function at specific points involves substituting the given value of x into the function and performing the arithmetic operations. The general steps include:

1. Substitute the value of x into the simplified function.
2. Multiply -2 by x.
3. Subtract this product from 6.2.
4. Record the result as $V(x)$.

Let's apply these steps for each value: -2, 0, and 5.

Evaluating V(x) when x = -2

Step-by-Step Calculation

- Step 1: Substitute $x = -2$ into the simplified function:

$$
V(-2) = 6.2 - 2 \times (-2)
$$

- Step 2: Calculate $-2 \times (-2)$:

$$
-2 \times (-2) = 4
$$

- Step 3: Subtract the product from 6.2:

$$
V(-2) = 6.2 - (-4) = 6.2 + 4
$$

- Step 4: Final calculation:

$$
V(-2) = 10.2
$$

Result:

When $x = -2$, $V(x) = 10.2$.

Evaluating V(x) when x = 0

Step-by-Step Calculation

- Step 1: Substitute $x = 0$:

$$
V(0) = 6.2 - 2 \times 0
$$

- Step 2: Calculate 2×0:

$$
2 \times 0 = 0
$$

- Step 3: Subtract:

$$
V(0) = 6.2 - 0 = 6.2
$$

Result:

When $x = 0$, $V(x) = 6.2$.

Evaluating V(x) when x = 5

Step-by-Step Calculation

- Step 1: Substitute $x = 5$:

$$
V(5) = 6.2 - 2 \times 5
$$

- Step 2: Calculate 2×5:

$$
2 \times 5 = 10
$$

- Step 3: Subtract:

$$
V(5) = 6.2 - 10 = -3.8
$$

Result:

When $x = 5$, $V(x) = -3.8$.

Summary of Evaluations

Value of x	Calculated $V(x)$	Explanation
-2	10.2	$6.2 - 2(-2) = 6.2 + 4 = 10.2$
0	6.2	$6.2 - 2(0) = 6.2 - 0 = 6.2$
5	-3.8	$6.2 - 2(5) = 6.2 - 10 = -3.8$

Importance of Evaluating Functions at Specific Points

Evaluating functions at specific points is essential for various reasons:

- Graphing: Determining points to plot the function accurately.

- Real-world applications: Calculating outputs based on different inputs in scenarios like economics, physics, engineering, etc.
- Understanding function behavior: Observing how the output changes as \(x \) varies.
- Solving equations: Finding solutions where the function equals a certain value.

Applications of Evaluating V(x) in Real Life

The ability to evaluate functions like \(V(x) = 6.2 - 2x \) has practical applications:

- Physics: Calculating velocity or displacement over time.
- Economics: Modeling profit or cost functions based on quantity.
- Engineering: Determining system responses at different input levels.
- Environmental science: Estimating pollutant levels based on emission rates.

Key Takeaways for Evaluating Functions

- Always simplify the function first if possible.
- Substitute the specific \(x \) value carefully.
- Follow the order of operations (PEMDAS/BODMAS): Parentheses, Exponents, Multiplication and Division, Addition and Subtraction.
- Double-check calculations for accuracy.
- Understand the context and units involved, especially in real-world scenarios.

Conclusion

Evaluating the function \(V(x) = 12 - 2x - 5.8 \) at \(x = -2 \), \(0 \), and \(5 \) involves straightforward substitution and arithmetic. The process reveals how the output varies with different input values, providing insights into the behavior of the function. Mastery of this skill is crucial for students and professionals alike, serving as a foundation for more advanced mathematical concepts and practical problem-solving across various fields. Whether analyzing trends, making predictions, or solving equations, understanding how to evaluate functions accurately is an indispensable part of mathematical literacy.

Frequently Asked Questions

What is the value of V(x) when x = -2?

V(-2) = 12 - 2(-2) - 5.8 = 12 + 4 - 5.8 = 10.2

How do you evaluate V(x) for x = 0?

V(0) = 12 - 2(0) - 5.8 = 12 - 0 - 5.8 = 6.2

What is the value of V(x) when x = 5?

V(5) = 12 - 2(5) - 5.8 = 12 - 10 - 5.8 = -3.8

Why is it important to substitute the specific x-value into the function?

Substituting specific x-values allows us to find the corresponding V(x) values, helping analyze how the function behaves at different points.

What pattern do you notice in the values of V(x) when x increases from -2 to 5?

As x increases, V(x) decreases, indicating a linear decreasing trend in the function.

How can understanding these evaluations help in graphing the function?

Evaluating V(x) at specific points provides key coordinates that aid in sketching the graph accurately.

Additional Resources

Evaluation of the Function V(x) = 12 - 2x - 5.8 at x = -2, 0, and 5: An In-Depth Analytical Review

Understanding the behavior of mathematical functions through specific value evaluations is a fundamental aspect of algebra and calculus. The function V(x) = 12 - 2x - 5.8, in particular, offers a clear example of how linear functions can be analyzed at various points to reveal insights about their characteristics, such as slope, intercepts, and overall trend. This article provides a comprehensive examination of this function, focusing on its evaluation at three distinct points: x = -2, x = 0, and x = 5. We will explore these evaluations in detail, interpret the results, and consider their implications within broader mathematical and practical contexts.

Understanding the Function V(x) = 12 - 2x - 5.8

Before diving into the specific evaluations, it is essential to understand the structure of the function itself. V(x) is a linear function, characterized by a constant rate of change and a straight-line graph when plotted on the coordinate plane.

Decomposition of the Function

The function V(x) can be rewritten in a simplified form to better interpret its components:

$V(x) = 12 - 2x - 5.8$

Combining the constant terms:

$V(x) = (12 - 5.8) - 2x$
$V(x) = 6.2 - 2x$

This simplified form reveals the key features:

- Slope (m): -2
- Y-intercept (b): 6.2

This indicates that the graph is a straight line crossing the y-axis at 6.2 and decreasing by 2 units for each increase of 1 in x.

Implications of the Slope and Intercept

The negative slope (-2) signifies that V(x) decreases as x increases. Conversely, as x decreases, V(x) increases. The y-intercept at 6.2 indicates the value of V(x) when x is zero.

Understanding these properties allows for quick estimations and provides foundational insights into how the function behaves across different values of x.

Evaluating V(x) at Specific Points

The core of this analysis involves calculating V(x) at three specific values of x: -2, 0, and 5. Each evaluation provides a snapshot of the function's behavior at these points, which can be interpreted to understand the function's overall trend.

Evaluation at x = -2

Step-by-step Calculation

Using the simplified form $V(x) = 6.2 - 2x$:

V(-2) = 6.2 - 2 (-2)
V(-2) = 6.2 + 4
V(-2) = 10.2

Interpretation

At x = -2, the function's value is 10.2. This is significantly higher than the y-intercept (6.2), aligning with the fact that as x decreases below zero, V(x) increases due to the negative slope. This point illustrates that when x is negative, the function reaches above its y-intercept, reflecting an upward trend in this region.

Practical Implication

In real-world scenarios, such as modeling profit, temperature, or other variables, this could suggest that at x = -2 (perhaps representing a negative time or a negative level of some factor), the dependent variable V(x) is relatively high.

Evaluation at x = 0

Calculation

V(0) = 6.2 - 2 0
V(0) = 6.2

Interpretation

At x = 0, the value of V(x) is exactly 6.2, which coincides with the y-intercept of the line. This confirms the consistency of the simplified form and the initial understanding of the function's behavior.

Practical Implication

This point serves as a baseline or reference point in the function's graph. It can be used for comparisons or to validate models in applied contexts, such as initial conditions in physics or economics.

Evaluation at x = 5

Calculation

V(5) = 6.2 - 2 5
V(5) = 6.2 - 10
V(5) = -3.8

Interpretation

At x = 5, the function's value drops to -3.8. This negative value indicates that the function decreases significantly as x increases, consistent with the negative slope. The function crosses into negative territory, which can be critical in applications where negative values are meaningful, such as deficits, losses, or negative temperatures.

Practical Implication

In real-world modeling, this could represent a scenario where, beyond a certain point ($x = 5$), the variable of interest becomes negative, signaling a decline or adverse effect. Recognizing where the function turns negative is crucial for planning, risk assessment, or decision-making.

Graphical Representation and Trend Analysis

Plotting the function $V(x) = 6.2 - 2x$ provides visual insight into its behavior across different values of x. The key features of the graph include:

- A y-intercept at (0, 6.2)
- A slope of -2, indicating a downward trend
- The point (-2, 10.2), which lies above the y-intercept
- The point (5, -3.8), which lies below the x-axis

This linear graph illustrates a consistent decline in V(x) as x increases, with the rate of change being uniform due to the constant slope.

Key Observations:

- As x moves from negative to positive, V(x) decreases steadily.
- The function crosses the x-axis between $x = 4$ and $x = 5$, specifically at $x = 6.2 / 2 = 3.1$, which is the x-value where $V(x) = 0$.

Calculating the Zero Point

Set V(x) to zero:

$0 = 6.2 - 2x$
$2x = 6.2$
$x = 3.1$

This is the point where the function intersects the x-axis, marking the transition from positive to negative values of V(x).

Broader Interpretations and Applications

The evaluation of V(x) at specific points serves more than just mathematical curiosity; it offers practical insights that can be applied across various fields.

Economic and Financial Contexts

Suppose V(x) models profit, revenue, or cost as a function of some variable x, such as production level, investment, or time.

- At x = -2: The high value (10.2) might suggest a scenario of high profit or output when the variable is negative, possibly representing a pre-start phase or an initial investment.
- At x = 0: The value (6.2) indicates the baseline or initial profit at the starting point.
- At x = 5: The negative value (-3.8) could signal a loss or deficit once the variable exceeds a certain threshold, highlighting potential risks or downturns.

Recognizing these points helps organizations strategize, optimize processes, or mitigate losses.

Physical and Scientific Applications

In physics, V(x) could represent potential energy, temperature, or other measurable quantities depending on x.

- The positive value at negative x suggests higher energy or temperature levels before a certain point.
- The zero crossing at x = 3.1 indicates a threshold or equilibrium point.
- The negative value at x = 5 could symbolize a state below a baseline, such as negative displacement or temperature.

Understanding these evaluations informs experimental design, safety measures, and theoretical modeling.

Mathematical Significance

From a purely mathematical perspective, analyzing these points demonstrates the linear nature of the function, the importance of slope, intercepts, and zero crossings. It underscores the utility of simplified forms for quick calculations and interpretations.

Educational Value

Evaluating functions at specific points reinforces fundamental algebraic skills, such as substitution, solving linear equations, and understanding the graphical implications of slope and intercepts.

Analytical Insights

These evaluations showcase the importance of selecting strategic points (like x=0 or points where V(x) crosses zero) to understand the function's behavior comprehensively.

Conclusion and Final Remarks

The detailed evaluation of $V(x) = 12 - 2x - 5.8$ at $x = -2$, 0, and 5 provides a window into the function’s behavior across different regions of its domain. The calculations reveal a consistent decreasing trend, with the function reaching high values at negative x, a baseline at $x = 0$, and negative values at larger positive x. These insights are valuable across multiple disciplines, from economics to physics, offering a clear understanding of how a simple linear function can model complex phenomena.

In practical terms, recognizing where $V(x)$ transitions from positive to negative (at $x = 3.1$) enables better decision-making, risk assessment, and strategic planning. The straightforward nature of the function allows for rapid computations and predictions, making it a useful educational tool and a foundational concept in applied mathematics.

Ultimately, the evaluation of this function underscores the power of mathematical analysis in translating abstract formulas into meaningful, actionable insights. Whether in academic settings or real-world applications

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