Graph The Function Y = |1.6x 2| 3.2. Over Which Interval Is The Function Increasing? (1.25,) (3.25,

Graph The Function Y = |1.6x 2| 3.2. Over Which Interval Is The Function Increasing? (1.25,) (3.25,

Understanding the Function Y = |1.6x 2| 3.2

When analyzing the behavior of the function Y = |1.6x 2| 3.2, it's essential to understand its structure and how it behaves across different intervals. The function involves an absolute value component, which typically results in a graph that is V-shaped, with a vertex at the point where the expression inside the absolute value equals zero.

In this case, the given function appears to be:

$Y = |1.6x - 2| + 3.2$

(Note: The original notation may have been slightly ambiguous, but based on standard mathematical forms, this interpretation is most plausible. If the original was intended differently, feel free to clarify.)

This form is a linear transformation of the absolute value function, which can be analyzed step-by-step.

Breaking Down the Function Components

1. The Absolute Value Part: |1.6x - 2|

The absolute value function, $|A|$, produces a V-shaped graph with its vertex at the point where $A = 0$. Here, $A = 1.6x - 2$.

- The vertex of the graph occurs when $1.6x - 2 = 0$, which gives:

$x = 2 / 1.6 = 1.25$

- At this point, the value of Y is:

$Y = |1.6(1.25) - 2| + 3.2 = |2 - 2| + 3.2 = 0 + 3.2 = 3.2$

So, the vertex is at (1.25, 3.2).

2. Transformation and Behavior

- The coefficient 1.6 outside the absolute value affects the slope of the V's arms.
- The +3.2 shifts the entire graph vertically upward by 3.2 units.
- The slope of the lines on either side of the vertex can be determined by the absolute value's linear components.

Graphing the Function

Visualizing the graph helps to understand where the function is increasing or decreasing.

Key points:

- Vertex at (1.25, 3.2)
- The "arms" extend infinitely in both directions along the x-axis.
- To the left of the vertex ($x < 1.25$), the function decreases as x approaches 1.25.
- To the right of the vertex ($x > 1.25$), the function increases.

Determining Intervals of Increase and Decrease

1. Behavior to the Left of the Vertex ($x < 1.25$)

- Since the absolute value function creates a V-shape, the function decreases as x moves toward 1.25 from the left.
- The slope on this side is negative, calculated from the linear part:

For $x < 1.25$,

$Y = |1.6x - 2| + 3.2 = (2 - 1.6x) + 3.2$

(because $1.6x - 2$ is negative, so absolute value becomes $-(1.6x - 2) = 2 - 1.6x$)

- The slope here is the derivative of Y with respect to x:

dY/dx = -1.6

Since -1.6 < 0, the function is decreasing on this interval.

2. Behavior to the Right of the Vertex (x > 1.25)

- For x > 1.25,

Y = |1.6x - 2| + 3.2 = (1.6x - 2) + 3.2

(since 1.6x - 2 is positive here)

- The derivative:

dY/dx = +1.6

Since +1.6 > 0, the function is increasing on this interval.

Interval of Increase for the Function

Based on the above analysis:

- The function decreases on the interval (-∞, 1.25).
- The function increases on the interval (1.25, ∞).

Therefore, the function Y = |1.6x - 2| + 3.2 is increasing over the interval:

(1.25, ∞)

This means that starting from x = 1.25, the function's value increases as x moves toward positive infinity.

Answer to the Specific Interval Query

Given the question:

Over which interval is the function increasing? (1.25,) (3.25,, no less than 1000 words.

The interval where the function is increasing is from x = 1.25 to infinity:

- (1.25, ∞)

If we are to specify a particular sub-interval, such as (1.25, 3.25), then:

- The function is increasing over (1.25, 3.25) as well, because it continues to increase beyond 3.25.

Summary:

- The function Y = |1.6x - 2| + 3.2 reaches its vertex at x = 1.25.
- It decreases on (-∞, 1.25).
- It increases on (1.25, ∞).
- Therefore, the function is increasing over the interval (1.25, ∞).

Additional Insights and Applications

Understanding the increasing and decreasing intervals of functions like Y = |1.6x - 2| + 3.2 is crucial in many fields such as calculus, economics, physics, and engineering. It helps in:

- Finding maximum and minimum points.
- Analyzing the behavior of functions for optimization.
- Understanding the rate of change across different domains.

Practical Examples

- Economics: The increasing part of a profit function indicates the range of production levels where profit increases.
- Physics: An increasing displacement over time signifies movement in a particular direction.
- Engineering: An increasing response signal in a system may indicate stabilization or positive feedback.

Conclusion

In conclusion, the graph of the function Y = |1.6x - 2| + 3.2 exhibits a V-shape with its vertex at (1.25, 3.2). The function decreases for x less than 1.25 and increases for x greater than 1.25. Therefore, the interval of increasing behavior is (1.25, ∞). Recognizing these intervals is vital for analyzing the function's behavior and applying this understanding to real-world problems. Whether optimizing a process, analyzing motion, or studying economic trends, knowing where a function increases or decreases provides valuable insights into the underlying phenomena.

Frequently Asked Questions

What does the graph of the function y = |1.6x - 2| + 3.2 look like?

The graph is a V-shaped graph with a vertex at the point where the expression inside the absolute value equals zero, specifically at x = 1.25. It opens upwards with two linear segments: decreasing to the left of the vertex and increasing to the right.

Over which interval is the function y = |1.6x - 2| + 3.2 increasing?

The function is increasing on the interval (1.25, ∞). Since the absolute value function's vertex is at x = 1.25, the function increases for all x greater than 1.25.

How do you find the vertex of the graph y = |1.6x - 2| + 3.2?

The vertex occurs where the expression inside the absolute value equals zero: 1.6x - 2 = 0, which gives x = 1.25. The y-coordinate at this point is y = |0| + 3.2 = 3.2, so the vertex is at (1.25, 3.2).

What is the significance of the point (1.25, 3.2) in the graph?

It is the vertex of the V-shaped graph, representing the minimum point of the function where the change in direction occurs from decreasing to increasing.

How can I verify the interval where the function is increasing?

By analyzing the slope of the linear segments: to the right of the vertex at x = 1.25, the slope is positive (since the slope of the right segment is 1.6), indicating the function is increasing on (1.25, ∞).

Additional Resources

Graph the function y = |1.6x^2| 3.2: Over which interval is the function increasing?

Introduction

Understanding the behavior of quadratic functions and their transformations is fundamental in the study of algebra and calculus. Among these, the function y = |1.6x^2| 3.2 introduces an interesting case of combining quadratic growth with absolute value operations, leading to distinctive graph features and increasing/decreasing intervals. This article aims to thoroughly analyze the graph of the function y = |1.6x^2| 3.2, determine over which intervals the function is increasing, and discuss the implications of its structure.

The Expression and Its Components

Before delving into the graph's behavior, it's crucial to interpret the function correctly. The provided function is:

$$ y = |1.6x^2| 3.2 $$

Given the notation, the most logical interpretation is:

$$ y = |1.6x^2| + 3.2 $$

since the '|' symbol suggests an absolute value, and the standard form of such functions involves an addition or subtraction after the absolute value. Alternatively, it could be a multiplication, but that would not be consistent with the typical notation.

Assumption: For clarity, we interpret the function as:

$$ y = |1.6x^2| + 3.2 $$

which is equivalent to:

$$ y = 1.6x^2 + 3.2 $$

because the quadratic $1.6x^2$ is always non-negative, so the absolute value does not change its value.

Note: If the original notation intended a different operation, such as a multiplication, please clarify. For the purposes of this analysis, we proceed with the above interpretation.

Fundamental Characteristics of the Function

1. Nature of the Graph

- The function is a parabola opening upwards since the quadratic coefficient (1.6) is positive.
- The addition of 3.2 shifts the parabola vertically upward by 3.2 units.

- The absolute value on the quadratic (if interpreted as an absolute value) does not change the graph because $1.6x^2 \geq 0$ for all real x.

2. Vertex and Axis of Symmetry

- Since the parabola is centered at $x=0$, the vertex is at $(0, y)$.
- The y-coordinate of the vertex is:

$$y = 1.6 \times 0^2 + 3.2 = 3.2$$

- Therefore, the vertex is at $(0, 3.2)$.

3. Symmetry

- The function is symmetric about the y-axis because the quadratic term x^2 is symmetric.

Graphing the Function

The graph of $y = 1.6x^2 + 3.2$ is a parabola opening upward, with:

- Vertex at $(0, 3.2)$,
- Y-intercept at $(0, 3.2)$,
- The parabola extending infinitely in both directions along the x-axis.

This shape is typical of quadratic functions with positive leading coefficients, translated vertically by 3.2 units.

Determining Intervals of Increase and Decrease

In calculus, the monotonicity (increasing or decreasing behavior) of a function is determined by its first derivative.

Step 1: Derivative of the Function

Given:

$$y = 1.6x^2 + 3.2$$

The derivative with respect to x:

$$ y' = \frac{dy}{dx} = 3.2x $$

Step 2: Critical Points

Set $y' = 0$:

$$ 3.2x = 0 \Rightarrow x = 0 $$

This is the only critical point, corresponding to the vertex.

Step 3: Sign of the Derivative

- For $x < 0$:

$$ y' = 3.2x < 0 \Rightarrow \text{function is decreasing} $$

- For $x > 0$:

$$ y' = 3.2x > 0 \Rightarrow \text{function is increasing} $$

Step 4: Interval of Increase

- The function increases on $(0, \infty)$.
- The function decreases on $(-\infty, 0)$.

Clarification of the Given Intervals

The prompt mentions intervals such as:

- $(1.25, \quad \text{something})$
- $(3.25, \quad \text{something})$

Based on the derivative analysis, the function is increasing over $(0, \infty)$. Therefore, the relevant intervals are:

- Increasing: $(0, \infty)$
- Decreasing: $(-\infty, 0)$

If the question is about which parts of the x-axis the function is increasing, the answer is for all $x > 0$, i.e., from 0 to infinity.

Addressing the Specific Intervals (1.25, 3.25, etc.)

Given the prior intervals:

- $(1.25, \quad ?)$
- $(3.25, \quad ?)$

These likely refer to specific ranges where the function's increasing behavior is being evaluated.

Since the function is increasing for $x > 0$, the interval $(1.25, \infty)$ is within the increasing region.

Similarly, $(3.25, \infty)$ also lies within the increasing zone.

Thus, the function is increasing over:

- $(1.25, \infty)$
- $(3.25, \infty)$

And decreasing over:

- $(-\infty, 0)$

Visualizing the Graph

To better understand the function's behavior, plotting key points helps:

x	y = 1.6x^2 + 3.2
-2	1.6(4) + 3.2 = 6.4 + 3.2 = 9.6
-1	1.6(1) + 3.2 = 1.6 + 3.2 = 4.8
0	3.2
1	4.8
2	6.4 + 3.2 = 9.6
3	1.6(9) + 3.2 = 14.4 + 3.2 = 17.6

The symmetry about $x=0$ and the upward opening confirm the increasing behavior for positive x.

Practical Implications

Understanding the intervals where the function increases is valuable in various fields:

- Optimization Problems: Knowing where the function increases helps identify maximum points within a domain.
- Physics Applications: For quadratic motion, the increasing interval may relate to acceleration or velocity changes.
- Data Modeling: Recognizing increasing trends ensures accurate interpretation of modeled data.

Summary of Key Findings

- The function $y = 1.6x^2 + 3.2$ (assuming the interpretation) is a parabola opening upward.
- Its vertex is at $(0, 3.2)$, which is its minimum point.
- The function decreases on $(-\infty, 0)$ and increases on $(0, \infty)$.
- Consequently, the function is increasing over all $x > 0$, including the intervals $(1.25, \infty)$ and $(3.25, \infty)$.

Conclusion

In analyzing the function $y = |1.6x^2| + 3.2$, or equivalently $y = 1.6x^2 + 3.2$, we've determined that the parabola's increasing interval is for all positive x. Specifically, the function increases over the intervals:

- From 0 to infinity: $(0, \infty)$
- Including the sub-intervals: $(1.25, \infty)$ and $(3.25, \infty)$

This understanding allows for precise application in mathematical modeling, graphing, and analysis, providing a clear picture of the function's growth behavior.

References

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- Khan Academy. (n.d.). Graphs of quadratic functions. [Online resource]

Note: If the original function involves different operations or a different interpretation, please provide clarification for a more tailored analysis.

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