Find The Minimum Value Of The Fuction F(x) =1. 2x2 - 6. 3x + 1. 2 To The Nearest Hundred

Find The Minimum Value Of The Fuction F(x) =1. 2x2 - 6. 3x + 1. 2 To The Nearest Hundred is a mathematical problem that involves analyzing a quadratic function to determine its smallest value, or minimum. Understanding how to find the minimum of a quadratic function is fundamental in algebra and calculus, and it has practical applications in fields such as economics, engineering, and data analysis. In this article, we will explore the steps to find the minimum value of the given function, interpret the results, and learn how to round the answer to the nearest hundred for clarity and simplicity.

Understanding the Function $F(x) = 1.2x^2 - 6.3x + 1.2$

Breaking Down the Function Components

The function provided is a quadratic function, which can generally be expressed in the form:

- **$ax^2 + bx + c$**

In our case, the function is:

```
F(x) = 1.2x² - 6.3x + 1.2
```

Where:
- **$a = 1.2$** (coefficient of x^2)
- **$b = -6.3$** (coefficient of x)
- **$c = 1.2$** (constant term)

Since the coefficient a is positive ($1.2 > 0$), the parabola opens upwards, which means the function has a minimum point at its vertex.

Why Find the Minimum? Applications and Significance

Identifying the minimum value of a quadratic function helps in various domains:
- Economics: Minimizing costs or maximizing profits.
- Engineering: Optimizing system performance.
- Data Science: Finding best-fit models through least squares.
- Mathematics: Understanding the properties of quadratic functions.

Knowing how to compute the vertex of the parabola is central to this process.

Calculating the Vertex of the Quadratic Function

Formula for the Vertex

For a quadratic function of the form $ax^2 + bx + c$, the x-coordinate of the vertex (which gives the minimum or maximum point) is:

$$x_{vertex} = -b / (2a)$$

Once the x-value is obtained, plugging it back into the function yields the minimum (or maximum) value itself.

Applying the Formula to Our Function

Let's calculate the x-coordinate of the vertex for F(x):

1. Identify coefficients:
    - $a = 1.2$
    - $b = -6.3$

2. Compute the x-coordinate:

$$x_{vertex} = -(-6.3) / (2 \quad 1.2) = 6.3 / 2.4 \approx 2.625$$

This suggests that the minimum value occurs approximately at $x \approx 2.625$.

Finding the Minimum Value of F(x)

Substituting x_{vertex} into F(x)

To find the minimum value, substitute $x = 2.625$ into the original function:

$$F(2.625) = 1.2(2.625)^2 - 6.3(2.625) + 1.2$$

Calculating step-by-step:

1. Square x:

$$(2.625)^2 = 6.890625$$

2. Multiply by 1.2:

$$1.2 \quad 6.890625 = 8.26875$$

3. Calculate -6.3 2.625:

$$-6.3 \quad 2.625 = -16.5375$$

4. Add the constant term:

$$8.26875 - 16.5375 + 1.2 = -6.96875$$

Therefore, the minimum value of the function is approximately -6.96875.

Rounding the Minimum Value to the Nearest Hundred

Understanding the Rounding Process

Rounding to the nearest hundred involves looking at the hundreds digit and adjusting the number accordingly. Since the minimum value is approximately -6.96875, which is close to zero, rounding to the nearest hundred will result in:

- Since -6.96875 is between -100 and 0, it rounds to 0 when rounded to the nearest hundred.

Final Rounded Result

Thus, the minimum value of the function, to the nearest hundred, is:

```
0
```

This indicates that, for practical purposes, the minimum of the function is effectively zero within the scale of hundreds.

Summary and Practical Insights

Key Takeaways

- The quadratic function $F(x) = 1.2x^2 - 6.3x + 1.2$ opens upward, indicating a minimum point.
- The x-coordinate of the minimum (vertex) is approximately 2.625.
- The minimum value of the function at this point is approximately -6.96875.
- When rounding to the nearest hundred, this value becomes 0.

Implications for Real-World Applications

Understanding how to find the minimum of a quadratic function allows professionals and students to optimize processes, minimize costs, or find best-fit solutions in data modeling. Rounding the result helps communicate findings succinctly, especially when dealing with large scales or simplified reporting.

Additional Tips for Finding the Minimum of Quadratic Functions

- Always verify the sign of coefficient *a*. A positive *a* indicates a minimum; a negative indicates a maximum.
- Use the vertex formula for quick calculations, but double-check by substituting back into the function.
- For complex functions, consider using graphing tools or calculus techniques to confirm the

minimum point.

Conclusion

Finding the minimum value of the quadratic function $F(x) = 1.2x^2 - 6.3x + 1.2$ involves identifying the vertex of the parabola using the formula $x = -b / (2a)$, calculating the function value at this point, and then rounding appropriately. In our case, the minimum value is approximately -6.96875, which, when rounded to the nearest hundred, simplifies to 0. This process not only enhances your algebraic skills but also equips you with practical tools for problem-solving across various domains.

Whether you're tackling academic exercises or applying these techniques in professional scenarios, mastering how to find and interpret the minimum of quadratic functions is a valuable mathematical skill that can significantly enhance your analytical capabilities.

Frequently Asked Questions

What is the function we are analyzing for its minimum value?

The function is $F(x) = 1.2x^2 - 6.3x + 1.2$.

How do we find the minimum value of a quadratic function like $F(x) = ax^2 + bx + c$?

For a quadratic function, the minimum (or maximum) occurs at $x = -b/(2a)$.

What is the value of x that minimizes $F(x) = 1.2x^2 - 6.3x + 1.2$?

$x = -(-6.3) / (2 1.2) = 6.3 / 2.4 \approx 2.625$.

What is the minimum value of F(x) when x is approximately 2.625?

Calculating F(2.625): $F(2.625) \approx 1.2(2.625)^2 - 6.32.625 + 1.2 \approx -7.425$.

To the nearest hundred, what is the minimum value of the function?

The minimum value of the function to the nearest hundred is -100.

Additional Resources

Find The Minimum Value Of The Function $F(x) = 1.2x^2 - 6.3x + 1.2$ To The Nearest Hundred is a common problem in algebra and calculus that challenges students and professionals alike to analyze quadratic functions and determine their minimum (or maximum) values efficiently. Whether you're preparing for a math exam, solving a real-world optimization problem, or simply sharpening your analytical skills, understanding how to find the minimum value of a quadratic function like this is fundamental. In this comprehensive guide, we'll explore the step-by-step process to find the minimum value of the given function, interpret the results, and understand the underlying concepts involved.

Understanding the Function

Before diving into calculations, it’s essential to understand the nature of the function:

- The function is a quadratic function, expressed as:

$$
F(x) = 1.2x^2 - 6.3x + 1.2
$$

- The coefficient of x^2 (which is 1.2) is positive, indicating that the parabola opens upward, and therefore, the function has a minimum point.

- Our goal is to find this minimum value of $F(x)$, and then round it to the nearest hundred as specified.

Step 1: Recognizing the Nature of the Quadratic Function

Quadratic functions are generally written in the form:

$$
f(x) = ax^2 + bx + c
$$

where:

- a, b, and c are constants.

- The parabola opens upward if $a > 0$, and downward if $a < 0$.

In our case:

$$
a = 1.2, \quad b = -6.3, \quad c = 1.2
$$

Since $a > 0$, the parabola opens upward, and the vertex represents the minimum point.

Step 2: Finding the Vertex (Minimum Point)

The vertex of a parabola given by $f(x) = ax^2 + bx + c$ occurs at:

$$
x_{vertex} = -\frac{b}{2a}
$$

This x-coordinate gives us the value of x where $F(x)$ attains its minimum.

Calculating:

$$
x_{min} = -\frac{-6.3}{2 \times 1.2} = \frac{6.3}{2.4}
$$

Perform the division:

$$
x_{min} = 2.625
$$

This is the point along the x-axis where the function reaches its minimum value.

Step 3: Calculating the Minimum Value $F(x_{min})$

Now that we know $x_{min} = 2.625$, substitute this into the original function to find the minimum value:

$$
F(2.625) = 1.2 \times (2.625)^2 - 6.3 \times 2.625 + 1.2
$$

Calculating each term:

1. $(2.625)^2 = 6.890625$

2. $1.2 \times 6.890625 = 8.26875$

3. $-6.3 \times 2.625 = -16.516875$

Adding all together:

$$
F(2.625) = 8.26875 - 16.516875 + 1.2
$$

Combine step by step:

- $8.26875 - 16.516875 = -8.248125$

- $-8.248125 + 1.2 = -7.048125$

Final result:

$$
F_{min} \approx -7.048125
$$

Step 4: Rounding to the Nearest Hundred

The problem asks to round the minimum value to the nearest hundred. Since:

$$
-7.048125 \text{ rounded to the nearest hundred} \rightarrow 0
$$

because any value between -50 and +50 rounds to 0 when rounded to the nearest hundred.

Therefore, the minimum value of the function, rounded to the nearest hundred, is 0.

Additional Insights and Context

Why is this important?

Understanding how to find the minimum of a quadratic function is essential in various fields such as physics (finding optimal points), economics (cost minimization), engineering, and data analysis. The process involves identifying the vertex, which provides key insights into the function's behavior.

How does this relate to real-world problems?

Suppose a company wants to minimize costs modeled by a quadratic function or a manufacturer aims to optimize production efficiency. Knowing how to find such minima allows for better decision-making and resource allocation.

Summary and Key Takeaways

- Recognize that quadratic functions with a positive a coefficient have a minimum point at their vertex.
- Use the vertex formula $x = -b / (2a)$ to find the x-coordinate of the minimum.
- Substitute this x-value back into the function to determine the minimum value.
- Round the resulting minimum to the nearest hundred as specified.

Final Remarks

In conclusion, the minimum value of the function \(F(x) = 1.2x^2 - 6.3x + 1.2 \) occurs at \(x = 2.625 \), where the function's value is approximately \(-7.048125\). Rounded to the nearest hundred, this is 0. Mastering this process enhances your ability to analyze quadratic functions efficiently and apply these principles to diverse practical problems.

Additional Practice Suggestions

- Try calculating the minimum of similar quadratic functions with different coefficients.
- Explore how changing \(a \), \(b \), or \(c \) affects the vertex and minimum value.
- Use graphing tools to visualize the parabola and confirm your calculations.

Embark on your quadratic journey with confidence! Mastering the art of finding minima and maxima unlocks a new level of mathematical understanding and problem-solving prowess.

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