If A=x +xy-6, B=6xy-2x +1 And C= 3x +7 -3xy,find :(i) A+B+C (ii)A-B+C (iii)A+B-C

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Introduction

Mathematics, especially algebra, forms the backbone of many scientific and engineering disciplines. It provides the tools necessary to analyze and solve complex problems through expressions, equations, and functions. Among the fundamental skills in algebra is understanding how to manipulate and simplify algebraic expressions involving variables and their combinations, such as addition and subtraction of polynomials.

In this article, we will explore a specific algebraic problem involving three expressions:

- $A = x + xy - 6$
- $B = 6xy - 2x + 1$
- $C = 3x + 7 - 3xy$

Our goal is to find the following:

1. The sum of the three expressions: $A + B + C$
2. The expression $A - B + C$
3. The expression $A + B - C$

These types of problems are not only fundamental for mastering algebraic manipulations but also serve as building blocks for understanding more advanced topics such as polynomial algebra, factorization, and solving equations.

In the subsequent sections, we will analyze each expression carefully, perform the necessary algebraic operations step-by-step, and interpret the results. Additionally, we will discuss the importance of simplifying algebraic expressions and how these techniques apply in real-world contexts such as physics, engineering, and computer science.

Understanding the Given Expressions

Before delving into the calculations, it’s essential to understand the structure of the given expressions:

Expression A

$$
A = x + xy - 6
$$

- Contains two terms involving the variable x and the product xy.
- The constant term is -6.

Expression B

$$
B = 6xy - 2x + 1
$$

- Features similar terms as A but with different coefficients.
- The terms are $6xy$, $-2x$, and a constant $+1$.

Expression C

$$
C = 3x + 7 - 3xy
$$

- Contains $3x$ and $-3xy$, along with a constant 7.
- Notice that C includes both a linear term in x and a product term xy, with coefficients that are multiples of 3.

Step-by-Step Calculation of the Expressions

1. Calculating $A + B + C$

Step 1: Write the sum

$$
A + B + C = (x + xy - 6) + (6xy - 2x + 1) + (3x + 7 - 3xy)
$$

Step 2: Group similar terms

Group the terms based on variables and constants:

- Terms involving xy: $xy + 6xy - 3xy$
- Terms involving x: $x - 2x + 3x$
- Constant terms: $-6 + 1 + 7$

Step 3: Simplify each group

- xy terms: $xy + 6xy - 3xy = (1 + 6 - 3)xy = 4xy$

- x terms: $x - 2x + 3x = (1 - 2 + 3)x = 2x$
- Constants: $-6 + 1 + 7 = 2$

Step 4: Write the simplified form

$$
A + B + C = 4xy + 2x + 2
$$

---

2. Calculating $A - B + C$

Step 1: Write the expression

$$
A - B + C = (x + xy - 6) - (6xy - 2x + 1) + (3x + 7 - 3xy)
$$

Step 2: Distribute the minus sign

$$
= x + xy - 6 - 6xy + 2x - 1 + 3x + 7 - 3xy
$$

Step 3: Group similar terms

- xy terms: $xy - 6xy - 3xy$
- x terms: $x + 2x + 3x$
- Constants: $-6 - 1 + 7$

Step 4: Simplify each group

- xy terms: $xy - 6xy - 3xy = (1 - 6 - 3)xy = -8xy$
- x terms: $x + 2x + 3x = (1 + 2 + 3) x = 6x$
- Constants: $-6 - 1 + 7 = 0$

Step 5: Final simplified form

$$
A - B + C = -8xy + 6x
$$

---

3. Calculating $A + B - C$

Step 1: Write the expression

$$
A + B - C = (x + xy - 6) + (6xy - 2x + 1) - (3x + 7 - 3xy)
$$

\]

Step 2: Distribute the minus sign

$$
= x + xy - 6 + 6xy - 2x + 1 - 3x - 7 + 3xy
$$

Step 3: Group similar terms

- xy terms: $xy + 6xy + 3xy$
- x terms: $x - 2x - 3x$
- Constants: $-6 + 1 - 7$

Step 4: Simplify each group

- xy terms: $xy + 6xy + 3xy = (1 + 6 + 3) xy = 10xy$
- x terms: $x - 2x - 3x = (1 - 2 - 3) x = -4x$
- Constants: $-6 + 1 - 7 = -12$

Step 5: Final simplified form

$$
A + B - C = 10xy - 4x - 12
$$

Significance of the Results

The calculations above yield simplified algebraic expressions that combine the original terms in various ways. These results are fundamental in algebra as they demonstrate how combining like terms simplifies complex expressions, making them easier to analyze or plug into further calculations.

Practical Applications

Understanding how to manipulate such expressions has numerous real-world applications:

- Physics: Calculating net forces or energy expressions often involves combining multiple algebraic terms.
- Engineering: Signal processing or control systems frequently utilize polynomial expressions where addition and subtraction impact system behavior.
- Economics: Budget calculations or profit/loss expressions involve combining multiple algebraic quantities.
- Computer Science: Algorithms that involve polynomial evaluation or symbolic computation require efficient algebraic manipulations.

Key Algebraic Techniques Demonstrated

- Grouping like terms: Combining terms involving the same variables.
- Distributive property: Managing negative signs and distributing across parentheses.
- Simplification: Reducing expressions to their simplest form for easier interpretation.

Additional Insights and Tips for Algebraic Manipulation

- Always write expressions carefully, ensuring all terms are correctly grouped.
- When subtracting expressions, distribute the negative sign to avoid mistakes.
- Use like terms to simplify expressions efficiently.
- Practice rewriting expressions with variables in different orders to develop flexibility.
- Remember that constants can be combined directly, and coefficients of similar terms are added or subtracted accordingly.

Conclusion

The algebraic expressions involving variables x and xy can seem complex at first glance. However, by systematically applying the principles of algebra—grouping like terms, distributing negatives, and simplifying—we can efficiently evaluate and manipulate these expressions.

The specific calculations for $A + B + C$, $A - B + C$, and $A + B - C$ demonstrate the power of algebraic manipulation in simplifying complex expressions into manageable forms:

- $\boxed{A + B + C = 4xy + 2x + 2}$
- $\boxed{A - B + C = -8xy + 6x}$
- $\boxed{A + B - C = 10xy - 4x - 12}$

Mastering these techniques enhances problem-solving skills and lays a strong foundation for tackling more advanced mathematical challenges. Whether in academics, research, or applied sciences, the ability to manipulate algebraic expressions is an invaluable skill that empowers you to analyze and interpret data, model real-world phenomena, and develop innovative solutions.

References

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Keywords for SEO Optimization

- Algebraic expressions
- Simpl

Frequently Asked Questions

Given A = x + xy - 6, B = 6xy - 2x + 1, and C = 3x + 7 - 3xy, how do you find the expression A + B + C?

To find A + B + C, add corresponding terms: (x + xy - 6) + (6xy - 2x + 1) + (3x + 7 - 3xy). Combine like terms: (x - 2x + 3x) + (xy + 6xy - 3xy) + (-6 + 1 + 7) = (2x) + (4xy) + (2) = 2x + 4xy + 2.

How do you compute A - B + C given the expressions A, B, and C?

Calculate A - B + C by subtracting B from A and then adding C: (x + xy - 6) - (6xy - 2x + 1) + (3x + 7 - 3xy). Simplify stepwise: (x + xy - 6) - 6xy + 2x - 1 + 3x + 7 - 3xy. Combine like terms: (x + 2x + 3x) + (xy - 6xy - 3xy) + (-6 - 1 + 7) = 6x - 8xy + 0 = 6x - 8xy.

What is the simplified form of A + B - C for the given expressions?

Compute A + B - C by adding A and B, then subtracting C: (x + xy - 6) + (6xy - 2x + 1) - (3x + 7 - 3xy). Simplify: (x + xy - 6 + 6xy - 2x + 1) - (3x + 7 - 3xy). Combine inside the parentheses: (x - 2x + 3x) + (xy + 6xy + 3xy) + (-6 + 1 - 7) = 2x + 10xy - 12.

How can you verify the calculation of A + B + C with specific values of x and y?

Choose specific values for x and y, for example x=1, y=2, then compute A, B, C individually: A=1+12-6=-3, B=612 - 21 +1=12 - 2 +1=11, C=31+7 - 312=10 - 6=4. Sum: A+B+C = -3+11+4=12. Check if the simplified expression 2x + 4xy + 2 with the same x and y gives 21 + 412 + 2=2+8+2=12, confirming correctness.

Is there a pattern or property to observe in the

combinations A+B+C, A-B+C, and A+B-C?

Yes, these combinations involve addition and subtraction of similar algebraic expressions, highlighting how combining like terms affects the overall expression. Recognizing these patterns helps in simplifying and understanding how the components interact algebraically.

What is the importance of simplifying such expressions in algebra?

Simplifying expressions like A+B+C, A-B+C, and A+B-C helps in solving equations more efficiently, understanding relationships between variables, and applying algebraic properties to reduce complex problems into manageable forms.

Can these expressions be used to model real-world problems? How?

Yes, expressions involving variables like x and y can model real-world scenarios such as resource allocation, physics problems, or economic models where variables represent quantities like cost, distance, or time. Simplifying these expressions helps in analyzing and making predictions based on the model.

Additional Resources

Understanding the Algebraic Expressions and Their Combinations: A Deep Dive into the Problem of Summation and Subtraction of Expressions A, B, and C

In the realm of algebra, understanding how to manipulate and combine expressions is fundamental to solving more complex mathematical problems. The problem at hand involves three algebraic expressions, labeled A, B, and C, each defined in terms of two variables: x and y. The task is to compute specific combinations of these expressions—namely, the sum of A, B, and C; the difference of A and B with the addition of C; and the sum of A and B with the subtraction of C. Such problems not only reinforce the basic principles of algebraic addition and subtraction but also serve as a stepping stone toward mastering polynomial operations, factoring, and solving equations.

This article aims to provide a comprehensive, detailed analysis of these expressions and their combinations. We will explore the structure of each expression, interpret their components, meticulously perform the algebraic operations, and interpret the results in a clear, systematic manner. By doing so, we will illuminate the underlying patterns and principles that govern algebraic manipulations, equipping readers with both the technical skills and conceptual understanding necessary for tackling similar problems.

Introduction to the Expressions A, B, and C

Before delving into the calculations, it is essential to understand the individual expressions provided:

- $A = x + xy - 6$
- $B = 6xy - 2x + 1$
- $C = 3x + 7 - 3xy$

At first glance, these expressions are polynomial-like in two variables, x and y, with mixed terms involving products xy. Recognizing the structure helps in understanding how to combine and simplify them.

Dissection of Each Expression

Expression A:
$A = x + xy - 6$

- Contains a linear term in x: x
- Contains a mixed term: xy
- Constant term: -6

Expression B:
$B = 6xy - 2x + 1$

- Mixed term: 6xy
- Linear term in x: -2x
- Constant: 1

Expression C:
$C = 3x + 7 - 3xy$

- Linear term in x: 3x
- Mixed term: -3xy
- Constant: 7

Notice that the expressions involve similar types of terms but with different coefficients. The key is to combine these expressions carefully, keeping track of like terms.

Methodology for Combining Expressions

The core of this problem involves algebraic addition and subtraction of the expressions A, B, and C. To ensure clarity, we will:

1. Identify like terms: Terms involving xy, x, and constants.

2. Combine coefficients of like terms: Add or subtract the coefficients accordingly.
3. Maintain the order: Keep the structure organized for clarity.
4. Simplify the resulting expression: Combine any like terms to their simplest form.

By following this systematic approach, we ensure accuracy and transparency in our calculations.

Calculating the Required Expressions

We are asked to compute three different expressions:

1. (i) A + B + C
2. (ii) A - B + C
3. (iii) A + B - C

Each involves combining A, B, and C in different ways, so let’s analyze each step-by-step.

Part 1: Compute A + B + C

Step 1: Write down the expressions

A = x + xy - 6
B = 6xy - 2x + 1
C = 3x + 7 - 3xy

Step 2: Sum the expressions

A + B + C = (x + xy - 6) + (6xy - 2x + 1) + (3x + 7 - 3xy)

Step 3: Group like terms

- Terms in xy: xy + 6xy - 3xy
- Terms in x: x - 2x + 3x
- Constants: -6 + 1 + 7

Step 4: Simplify each group

- xy terms: xy + 6xy - 3xy = (1 + 6 - 3)xy = 4xy
- x terms: x - 2x + 3x = (1 - 2 + 3)x = 2x
- Constants: -6 + 1 + 7 = 2

Step 5: Write the simplified expression

A + B + C = 4xy + 2x + 2

Result:
A + B + C = 4xy + 2x + 2

Part 2: Compute A - B + C

Step 1: Write down the expressions

A = x + xy - 6
B = 6xy - 2x + 1
C = 3x + 7 - 3xy

Step 2: Form the expression

A - B + C = (x + xy - 6) - (6xy - 2x + 1) + (3x + 7 - 3xy)

Step 3: Distribute the negative sign in B

A - B + C = x + xy - 6 - 6xy + 2x - 1 + 3x + 7 - 3xy

Step 4: Group like terms

- xy terms: xy - 6xy - 3xy
- x terms: x + 2x + 3x
- Constants: -6 - 1 + 7

Step 5: Simplify each group

- xy terms: xy - 6xy - 3xy = (1 - 6 - 3)xy = -8xy
- x terms: x + 2x + 3x = (1 + 2 + 3) x = 6x
- Constants: -6 - 1 + 7 = 0

Step 6: Write the simplified expression

A - B + C = -8xy + 6x

Result:
A - B + C = -8xy + 6x

Part 3: Compute A + B - C

Step 1: Write down the expressions

$A = x + xy - 6$
$B = 6xy - 2x + 1$
$C = 3x + 7 - 3xy$

Step 2: Form the expression

$A + B - C = (x + xy - 6) + (6xy - 2x + 1) - (3x + 7 - 3xy)$

Step 3: Distribute the negative sign in C

$A + B - C = x + xy - 6 + 6xy - 2x + 1 - 3x - 7 + 3xy$

Step 4: Group like terms

- xy terms: $xy + 6xy + 3xy$
- x terms: $x - 2x - 3x$
- Constants: $-6 + 1 - 7$

Step 5: Simplify each group

- xy terms: $xy + 6xy + 3xy = (1 + 6 + 3) xy = 10 xy$
- x terms: $x - 2x - 3x = (1 - 2 - 3) x = -4x$
- Constants: $-6 + 1 - 7 = -12$

Step 6: Write the simplified expression

$A + B - C = 10xy - 4x - 12$

Result:
$A + B - C = 10xy - 4x - 12$

Interpretation and Analysis of Results

Having meticulously calculated these combinations, it is insightful to analyze what these results reveal about the structure of the expressions and their interrelations.

Patterns Observed

- The sum A + B + C yields a relatively balanced combination, with positive coefficients for xy and x, and a constant term. It indicates an additive synergy among the expressions, culminating in larger coefficients.

- The difference A - B + C results in a significant negative coefficient for xy (-8xy) and a positive coefficient for x (6x), with the constant term canceling out. This suggests that subtracting B from A and then adding C emphasizes the negative contribution of the xy term.
- The combined A + B - C results in a large positive xy coefficient (10xy), with negative x coefficient and a constant term. The presence of a higher positive xy term indicates how the combination amplifies the mixed term, possibly reflecting interactions between the original expressions.

Variable and Coefficient Patterns

- The coefficients of xy in the combined expressions demonstrate how the algebraic combination impacts the emphasis on the interaction term xy.
- The coefficients of x reveal how the linear component is affected by addition and subtraction.
- The constants shift depending on the combination, illustrating the net constant shift resulting from the operations.

Practical Implications

This exercise exemplifies how algebraic expressions can be manipulated to reveal underlying relationships and patterns. In applied mathematics, physics, or engineering, such manipulations are essential for simplifying

If A X Xy 6 B 6xy 2x 1 And C 3x 7 3xy Find I A B C Ii A B C Iii A B C

If A X Xy 6 B 6xy 2x 1 And C 3x 7 3xy Find I A B C Ii A B C Iii A B C

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