MAZIE MATH

A Foundational Identity-Preserving Arithmetic

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1. Foundational Principle

Mazie Math defines arithmetic from the standpoint of identity preservation.

The defining rule is:

a/0 = a

This is not an exception.

This is an axiom.

2. Distinction of Operations

Mazie Math recognizes that multiplication and division are not required to be strict inverses in all cases.

Multiplication is defined normally:

a * 0 = 0

Zero annihilates magnitude under multiplication.

Division, however, is not universally defined as inverse multiplication.

When the divisor is zero, division is defined differently:

a/0 returns the numerator unchanged.

Thus:

a/0 = a

3. Structural Meaning

In Mazie Math:

Zero has two roles.

Role 1:

As a multiplier, zero collapses magnitude.

Role 2:

As a divisor, zero preserves identity.

These roles are intentionally not symmetric.

Mazie Math does not assume:

(a/b) * b = a

for all b.

That equivalence does not hold when b = 0.

4. Non-Contradiction Condition

Because division is not defined as strict inverse multiplication at zero, the following step is invalid:

(a/0) * 0 = a

That step assumes inverse structure that Mazie Math does not adopt.

Therefore:

a * 0 = 0

a/0 = a

can both hold without collapse.

5. Conceptual Interpretation

Mazie Math separates:

Magnitude operations (multiplication)

Identity operations (division by zero)

Multiplication by zero eliminates size.

Division by zero preserves identity.

This is a deliberate structural choice.

6. Relation to Mathematical Literature

Modern algebra allows alternative axiom systems provided consistency is maintained.

Related structures include:

- Meadows (totalized division systems)

- Non-involutive meadows

- Abstract data type treatments of rational numbers

See:

Bergstra and Tucker, Journal of the ACM, 2007.

Bergstra and Ponse, arXiv:1406.6878.

Bergstra et al., Theoretical Computer Science, 2009.

These works define division for all values, including zero, though they do not choose the identity-return rule that Mazie Math adopts.

Mazie Math differs in choosing:

a/0 = a

as its zero-division axiom.

7. Core Summary

Mazie Math is defined by two axioms:

a * 0 = 0

a/0 = a

Division by zero preserves identity.

Multiplication by zero annihilates magnitude.

The system is coherent because division is not universally constrained to act as inverse multiplication at zero.

REFERENCES

(Background on Division by Zero and Totalized Algebraic Systems)

1. Bergstra, J.A., and Tucker, J.V.

   "The Rational Numbers as an Abstract Data Type."

   Journal of the ACM, Vol. 54, No. 2, Article 7, 2007.

   This paper introduces the concept of treating rational numbers

   as an abstract algebraic data type and discusses totalized

   operations, including defined behavior for division at zero.

2. Bergstra, J.A., and Ponse, A.

   "Division by Zero in Common Meadows."

   arXiv preprint arXiv:1406.6878, 2014.

   Develops the theory of meadows, algebraic structures in which

division is total (defined for all inputs), including zero.

3. Bergstra, J.A., Bethke, I., and Ponse, A.

    "Cancellation Meadows: A Generic Basis Theorem and Some Applications."

    Theoretical Computer Science, Vol. 409, Issues 3, 2008, pp. 363–378.

    Provides foundational algebraic structure for systems where

    division is defined universally, though typically with

    0 inverse defined as 0.

4. Carlstrom, M.

    "Wheels – On Division by Zero."

    Mathematical Structures in Computer Science, Vol. 14, No. 1, 2004, pp. 143–184.

    Introduces wheel theory, an algebraic structure in which

    division is totalized and zero divisors are handled in a

    generalized way.

5. Knuth, Donald E.

    "Two Notes on Notation."

    American Mathematical Monthly, Vol. 99, No. 5, 1992, pp. 403–422.

    Discusses alternative treatments of undefined expressions

    in mathematical systems, including structured handling

    of exceptional cases.

6. Lang, Serge.

    "Algebra."

    Springer Graduate Texts in Mathematics, various editions.

Standard reference for classical field and ring axioms,

useful for contrast with systems that alter inverse rules.

Clarification:

None of the above references define the rule:

a/0 = a

However, they demonstrate that:

- Division by zero can be formally defined.

- Algebraic systems can be constructed where inverse laws

   are modified or restricted.

- Totalized arithmetic structures are legitimate areas of study.

Mazie Math differs by choosing identity preservation

as the zero-division rule.