CQ

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Does zero divide zero?

Open Mathematics Collaboration*†

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Abstract

We address a discussion whether zero divides zero.

keywords: zero, division, number theory, arithmetic, algebra

Introduction

1. $a|b$ $(a, b \in \mathbb{Z}\backslash\{0\})$ means a divides b.

2. Does $0|0$?

The $0|0$ theorem

3. Theorem 1.1 of [1] states that $0|n \rightarrow (n = 0)$.

4. According to [1], (3) means *zero divides only zero*.

Question

5. Does $0|n \rightarrow (n = 0)$ really mean *zero divides only zero*?

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*All authors with their affiliations appear at the end of this paper.

†Corresponding author: mplobo@uft.edu.br | Join the Open Mathematics Collaboration

Propositional Logic

6. Let $P \equiv 0|n$ and $Q \equiv (n = 0)$.

7. (5) reads $P \to Q$.

8. If P is false, $P \to Q$ is true.

9. So, even if 0 does not divide 0, the theorem (3) is still true.

Divisibility

10. <u>Definition</u>: $a|b \leftrightarrow \exists k \in \mathbb{Z}(ak = b)$.

11. According to (10), $0|0$.

Final Remarks

12. Does $0|0$?

13. Although the theorem (3) states that $0|n \to (n = 0)$ is true, it does not necessarily mean $0|0$.

14. From (10) and (11), if $0|0$, then $\frac{0}{0} =$? [2]

Open Invitation

Review, add content, and **co-author** this paper [3, 4].
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Ethical conduct of research

This original work was pre-registered under the OSF Preprints [5], please cite it accordingly [6]. This will ensure that researches are conducted with integrity and intellectual honesty at all times and by all means.

References

[1] Apostol, Tom M. *Introduction to analytic number theory.* Springer Science & Business Media, 2013.

[2] Lobo, Matheus P. "A Multivalued Infinity." *OSF Preprints*, 6 Mar. 2020. https://doi.org/10.31219/osf.io/vtjy7

[3] Lobo, Matheus P. "Microarticles." *OSF Preprints*, 28 Oct. 2019. https://doi.org/10.31219/osf.io/ejrct

[4] Lobo, Matheus P. "Simple Guidelines for Authors: Open Journal of Mathematics and Physics." *OSF Preprints*, 15 Nov. 2019. https://doi.org/10.31219/osf.io/fk836

[5] COS. *Open Science Framework.* https://osf.io

[6] Lobo, Matheus P. "Does Zero Divide Zero?." *OSF Preprints*, 3 Jan. 2020. https://doi.org/10.31219/osf.io/5txzg

The Open Mathematics Collaboration

Matheus Pereira Lobo (lead author, mplobo@uft.edu.br)[1,2]

[1]Federal University of Tocantins (Brazil); [2]Universidade Aberta (UAb, Portugal)