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The properties of negation and zero in ringoids as defined by Kulisch

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In [1,2] Kulisch defines (ordered) ringoids and vectoids to provide a theoretical basis for computer arithmetic and interval arithmetic. One interesting aspect of his treatment is the search for necessary and sufficient conditions for a meaningful notion of negation and zero. In this paper we consider this both from the point of view of functions on the underlying set and from a category theoretical standpoint. It turns out that the conditions provided by Kulisch can be restated in other forms, but that the original form is probably both necessary and sufficient for the intended purpose.

References:

[1] U.W. Kulisch and W.L. Miranker, The arithmetic of the digital computer: a new approach, *SIAM Rev.*, 28 (1986), No 1, pp. 1–40.

[2] U.W. Kulisch, *Computer arithmetic and validity: Theory, implementation, and applications*, de Gruyter, Berlin, 2nd revised and extended edition, 2013.