= 1 (in the reals) and ? 999 =
? 1 (in the 10 @-@ adics) , then by " blind faith and unabashed juggling of symbols " one may add the two equations and arrive at ? 999 @.@ 999 ? = 0 . This equation does not make sense either as a 10 @-@ adic expansion or an ordinary decimal expansion , but it turns out to be meaningful and true if one develops a theory of " double @-@ decimals " with eventually repeating left ends to represent a familiar system : the real numbers .

= = = Ultrafinitism = = =

The philosophy of ultrafinitism rejects as meaningless concepts dealing with infinite sets , such as the summation of infinitely many numbers <formula> corresponding to the positional values of the decimal digits in <formula> . In this approach to mathematics , only some particular (fixed) number of finite decimal digits are meaningful . Instead of " equality " , one has " approximate equality " , which is equality up to the number of decimal digits that one is permitted to compute . Doron Zeilberger , a proponent of this philosophy , calls the equality <formula> " not even wrong " , for this reason . Instead , he argues that there is an algorithm that can check that the sequence obtained by truncating the decimal expansion of 0 @.@ 999 ... is approximately equal to 1 within a specified error . Although Katz and Katz (2010a) argue that ultrafinitism may capture the student intuition that 0 @.@ 999 ... ought to be less than 1 , the ideas of ultrafinitism do not enjoy widespread acceptance in the mathematical community , and the philosophy lacks a generally agreed @-@ upon formal mathematical foundation .

= = Related questions = =

Zeno 's paradoxes , particularly the paradox of the runner , are reminiscent of the apparent paradox that 0 @.@ 999 ? and 1 are equal . The runner paradox can be mathematically modelled and then , like 0 @.@ 999 ? , resolved using a geometric series . However , it is not clear if this mathematical treatment addresses the underlying metaphysical issues Zeno was exploring .

Division by zero occurs in some popular discussions of 0 @.@ 999 ? , and it also stirs up contention . While most authors choose to define 0 @.@ 999 ? , almost all modern treatments leave division by zero undefined , as it can be given no meaning in the standard real numbers . However , division by zero is defined in some other systems , such as complex analysis , where the extended complex plane , i.e. the Riemann sphere , has a " point at infinity " . Here , it makes sense to define 1 ? 0 to be infinity ; and , in fact , the results are profound and applicable to many problems in engineering and physics . Some prominent mathematicians argued for such a definition long before either number system was developed .

Negative zero is another redundant feature of many ways of writing numbers . In number systems , such as the real numbers , where " 0 " denotes the additive identity and is neither positive nor negative , the usual interpretation of " ? 0 " is that it should denote the additive inverse of 0 , which forces ? 0 = 0 . Nonetheless , some scientific applications use separate positive and negative zeroes , as do some computing binary number systems (for example integers stored in the sign and magnitude or ones ' complement formats , or floating point numbers as specified by the IEEE floating @-@ point standard) .