

## Re: Demonstrating that $0.999... = 1$

**Source:** <http://sci.tech-archive.net/Archive/sci.math/2004-09/4012.html>

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**From:** David C. Ullrich ([ullrich\\_at\\_math.okstate.edu](mailto:ullrich_at_math.okstate.edu))

**Date:** 09/17/04

Date: Fri, 17 Sep 2004 07:07:20 -0500

On Fri, 17 Sep 2004 08:11:48 GMT, [rmercham@incandec.com](mailto:rmercham@incandec.com) (Ray Mercham) wrote:

>On Thu, 16 Sep 2004 16:26:37 -0500, David C. Ullrich <[ullrich@math.okstate.edu](mailto:ullrich@math.okstate.edu)>

>wrote:

>

>>On Thu, 16 Sep 2004 15:20:54 GMT, [rmercham@incandec.com](mailto:rmercham@incandec.com) (Ray Mercham)

>>wrote:

>>

>>>On Thu, 16 Sep 2004 09:21:02 -0500, David C. Ullrich <[ullrich@math.okstate.edu](mailto:ullrich@math.okstate.edu)>

>>>wrote:

>>>

>>>>On Thu, 16 Sep 2004 12:26:33 GMT, [artmason@yahoo.com](mailto:artmason@yahoo.com) (Art) wrote:

>>>>

>>>>>On Thu, 16 Sep 2004 13:49:39 +0200, "Denis Feldmann" <[denis.feldmann@wanadoo.fr](mailto:denis.feldmann@wanadoo.fr)>

>>>>>wrote:

>>>>>

>>>>>> I would have thought that transparantly obvious. The original poster

>>>>>> avoided doing anything that would involve wondering what happened "at

>>>>>> the end". That was, I assume, the whole point of his/her posting.

>>>>>>

>>>>>> Your example, on the other hand, immediately raises the question:

>>>>>> "What happens to the leftmost one when you multiply by 10".

>>>>>>

>>>>>>

>>>>>>You seem specially obtuse, or trolling, or playing devil's advocate. WHERE

>>>>>>DO YOU SEE A LEFTMOST ONE DIGIT IN ...1111 ? (and why is this question

>>>>>>different to "what is the rightmost one digit of 0.1111....?")

>>>>>>

>>>>>>You seem specially obtuse, or trolling, or playing devil's advocate. :)

>>>>>>

>>>>>>The whole point of the OP's post was to explain to the sort of people who

>>>>>>\_would\_ worry about a 'leftmost 1'.

>>>>>>

>>>>>>Fine. Now explain what Denis and I don't get: Why would these people

>>>>>>\_not\_ worry about the rightmost 9 in 0.999...?

>>>>>>

>>>>>>I assumed it was because the OP took great care to ensure that nothing special

>>>happened at some imagined rightmost digit.  
>>>  
>>>If someone *\_is\_* worrying about the supposed 'end' of a string of digits, they  
>>>will certainly worry about:  
>>>  
>>>1) A carry  
>>>2) A borrow  
>>>3) 'Moving' the digit  
>>>  
>>>What makes the original demo work is that it removes any problem with what might  
>>>be 'happening'. Whether you believe there is or isn't a rightmost digit, you  
>>>don't have to worry about it because it demonstrably doesn't react with its  
>>>neighbor(s).  
>>  
>>And again (and again and again) how is what I said about ...111 any  
>>different in regard to any of this?  
>  
>To quote another poster:  
>  
>You seem specially obtuse, or trolling  
>  
>But one last try – What you said about ...111 would likely elicit the question  
>"what happens right at the left when you multiply by 10?"

if you say so. This is not an answer to the question I've been asking.  
What is the *\_difference\_*? If what you just said is true, then *\_why\_* is  
it not true that the OP is likely to elicit the question of what  
happens at the rightmost place when you multiply  $0.111...$  by 9?

You keep saying the question is likely to come up in one case but  
not in the other. But you haven't given any indication of *\_why\_*  
it comes up in one case but not the other.

>The whole problem with people who do not understand that  $0.999... = 1$  is that  
>they are concerned with what happens at the "ends" of infinite strings of  
>digits. By multiplying by ten (which most people are taught involves sticking a  
>zero on the left and moving the number one place to the left – because it's a  
>part of multi-digit multiplication), you have introduced that element of doubt  
>into your "proof".  
>  
>So they'd never buy it in a million years.  
>  
>So you've come up with an absurdity that even a non mathematician will not  
>believe.  
>  
>Well done – good work ;)

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David C. Ullrich