

# Re: Comparing Proofs of Rosser's 1936 Theorem

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*Source:* <http://sci.tech-archive.net/Archive/sci.logic/2006-03/msg00067.html>

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- *From:* "Charlie-Boo" <[shymathguy@xxxxxxxxxx](mailto:shymathguy@xxxxxxxxxx)>
  - *Date:* 4 Mar 2006 17:08:38 -0800
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David C. Ullrich wrote:

On 3 Mar 2006 06:42:50 -0800, "Charlie-Boo" <[shymathguy@xxxxxxxxxx](mailto:shymathguy@xxxxxxxxxx)> wrote:

David C. Ullrich wrote:

On 19 Feb 2006 15:15:30 -0800, "Charlie-Boo" <[chvol@xxxxxxxx](mailto:chvol@xxxxxxxx)> wrote:

What is the relationship between the following two proofs of Rosser's 1936 theorem?

1. [Turing 1937] We can list the provable sentences, and by negating each list the refutable sentences. If the system is both complete and consistent then any given sentence will be provable or refutable but not both, and thus will be seen in either but not both lists, and we can tell if the given sentence is provable, which amounts to solving the halting problem where halt yes means provable and halt no means refutable, so halt means decidable.

2. [C-B 2005] If the system is both complete and consistent, then the refutable sentences coincide with the unprovable sentences, but the former is an r.e. set whereas the latter is not.

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They're essentially the same proof.

The first is written out in much more detail, perhaps because the concepts mentioned in the second were less well-known in 1937 or perhaps just because it happens to be written out in more detail. And of course there are various other ways the details could be filled in in the second.

But the two are essentially the same – the one basic idea appears in both proofs, in different words.

Really? Well, you really beat me on that one, David. I thought they were different. So, what is the basic idea that appears in both? I want to learn where I went wrong and correct my mistake.

I thought # 2 was shorter, simpler, doesn't involve knowing the proof that the Halting Problem is unsolvable, and is easier to understand. What is the "one basic idea" that you are referring to that you discovered appears in both proofs?

The basic idea in your quote(?) of Turing is given by what you wrote.

You wrote, "They're essentially the same proof. . . . The one basic idea appears in both proofs, in different words." But where does Turing's argument appear within mine? What is the "basic" idea that you were referring to? Or is it all just a lie to try to deny me credit for my discovery?

It's obviously not true to say there're the same proof. My proof is much shorter and simpler than Turing's. He describes the construction of a decision procedure for theorems, and then relies on the proof of the unsolvability of the Halting Problem. My proof, on the other hand, does not involve writing a decision procedure nor does it rely on the unsolvability of the Halting Problem. Instead, I merely rely on known facts concerning the provable and refutable sentences.

I find my proof easier to understand than Turing's because it doesn't use a decision procedure and only relies on simple comparisons of sets with known properties.

How can you say they are the same? Honestly, are you just trying to

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deny me credit for coming up with a proof – in fact, one simpler (and thus arguably better) than Turing's? You are only making an assertion that flies in the face of the facts – a blatant lie – in a desperate attempt to deny the obvious fact that my proof is not only different, it is much simpler in the principles that it uses and the overall complexity of the proof is simpler.

The difference is that when a person reads my proof he is apt to find it easier to understand than the Turing proof. Thus it is a better proof in that regard.

But to take two different proofs such as these, and the reader can see they are different and that one is simpler and easier to understand, and then say, "No, you might think there's a difference, but there really isn't." is a real joke. It is a lie that is a desperate attempt to deny someone credit for a mathematical discovery.

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David C. Ullrich