

Re: Comparing Proofs of Rosser's 1936 Theorem

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- *From:* "Charlie-Boo" <shymathguy@xxxxxxxxx>
 - *Date:* 3 Mar 2006 06:42:50 -0800
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David C. Ullrich wrote:

On 19 Feb 2006 15:15:30 -0800, "Charlie-Boo" <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.

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.

Re: Comparing Proofs of Rosser's 1936 Theorem

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?

Thanks for the help,

C-B

David C. Ullrich