

Re: Rado's Sigma and the Halting Problem for Programs

Source: <http://coding.derkeiler.com/Archive/General/comp.theory/2004-08/2087.html>

From: r.e.s. (r.s_at_ZZmindspring.com)

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"peter_douglass" <baisly@gis.net> wrote ...

–snip–

> *I believe the Halting Theorem may be proven without recourse*

> *to reductio ad absurdum. Here is my stab at it.*

–snip–

> *Assume that from a Turing Machine M we can construct*

^^^^^^

> *a Turing Machine M' such that the following holds:*

> *Eval(M',x) == begin*

> *if Eval(M, <G'(M'),x>) == "no"*

> *then return "yes"*

> *else loop_forever();*

> *end*

–snip–

Can you prove, without reductio ad absurdum, that such an M' can always be constructed?

The self-referring definition of M' would seem to make that less tractable than the usual type of definition of a "derived TM" for reductio ad absurdum, e.g. (using the usual shorthand suppressing the encoding of TMs & inputs):

M'(P) converges iff M(P,P) converges to "no".

Defining M' in terms of M alone is tractable, but your version may not be. (?)

--r.e.s.