

# Re: FOL & completeness

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- *From:* "MoeBlee" <[jazzmobe@xxxxxxxxxxx](mailto:jazzmobe@xxxxxxxxxxx)>
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bargiax wrote:

MoeBlee wrote:

That should be corrected slightly:

The completeness theorem is that if a formula is satisfied by ALL models then the formula is provable.

iff, for a first order theory

The other direction is usually called the 'soundness theorem'. So "iff" is equivalent to the conjunction of the completeness and soundness theorems.

The incompleteness theorem is that for any consistent, recursive set of axioms, there is a sentence that is true in the standard model of number theory (but NOT true in all models) that is not provable from said axioms.

So, can we say that the same Goedel theorem affirms that G is not logically valid ?

I don't think the parenthetical part "(but NOT true in all models)" is usually mentioned as itself a clause in the incompleteness theorem. I just added the parenthetical to highlight for you the difference between the completeness theorem (which addresses formulas that are satisfied by every model, (or, for sentences, that are true in every model)) and the incompleteness theorem (which addresses sentences that are true in the standard model of number theory, but which, I'm

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parenthetically now adding, are not necessarily true in all models and which we can see that they are not true in all models).

That such sentences are not true in all models follows from the completeness theorem. If a sentence is not provable from certain sets of axioms, then the sentence is not valid.

MoeBlee

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