Deductively Sound Formal Proofs

Using the sound deductive inference model as the basis of the a notion of a formal system defines [Deductively Sound Formal Proofs]. Within (DSFP) closed Well-formed formula that were undecidable in other formal systems are excluded on the basis that they do not belong to deductively sound inference.

The sound deductive inference model specifies:
[a connected sequence of valid deductions from true premises to a true conclusion]

> A wf C is said to be a consequence in S of a set Γ of wfs if and only if there is a sequence B1, …, Bk of wfs such that C is Bk and, for each i, either Bi is an axiom or Bi is in Γ, or Bi is a direct consequence by some rule of inference of some of the preceding wfs in the sequence. Such a sequence is called a proof (or deduction) of C from Γ. The members of Γ are called the hypotheses or premisses of the proof. **We use Γ ⊢ C as an abbreviation for "C is a consequence of Γ"**... (Mendelson 2015:28)

To make the conventional formal proofs of mathematical logic conform to the sound deductive inference model we only have to select the subset of formal proofs having true premises: **this Γ ⊢ C becomes this True(Γ) ⊢ C**.

How hard is it to understand the basic model of Sound_Deduction?
True premises combined with valid inference necessitates true consequences.

The argument is deductively unsound when: ¬(True(Γ) ∨ (Γ ⊢ C) ∨ (Γ ⊢ ¬C))
(a) Not all of the premises specified by Γ are true.
(b) There is no sequence B1, …, Bk of wfs from Γ to (C or ¬C).
(c) ∴ **¬Deductively_Sound(Γ, C)** **if (a) or (b) then (c)**

When a man that has never been married is asked:
Have you stopped beating your wife yet?

The lack of a correct yes or no answer does not indicate that all of human reasoning is fundamentally incomplete. When-so-ever a yes or no question lacks a correct yes or no answer the question itself is incorrect.

This same reasoning applies equally to logic sentences: When-so-ever a logic sentence lacks a correct true or false Boolean value the logic sentence itself is incorrect.

When the above is applied to every conventional undecidable sentence of mathematical logic it simply decides that these sentences are deductively unsound thus semantically erroneous.

Mendelson, Elliott 2015. Introduction to Mathematical Logic (sixth edition). Boca Raton: Taylor & Francis Group LLC.