

Analyse the following arguments and decide (prove) which of them are valid:

A₁ *Tom does not know that Francisco is the Pope.*

 The Pope exists.

Note. Recall that *Knowing* is a factivum. The premise is to be read as denoting the proposition that takes the value **F**.

A₂ *Tom knows that the Mayor of Ostrava is Ivo.*
 Tom believes of the Mayor of Ostrava that he is in danger.

 Tom believes that Ivo is in danger.

A₃ *Tom knows that the Mayor of Ostrava is Ivo.*
 Tom believes that the Mayor of Ostrava is in danger.

 Tom believes of the Mayor of Ostrava that he is in danger.

Consider both types of knowing and believing, i.e., intensional *Know*, *Believe*/ $(\text{OI}\text{O}_{\tau\text{O}})_{\tau\text{O}}$ as well as hyperintensional *Know**, *Believe**/ $(\text{OI}^*\text{I})_{\tau\text{O}}$.

In other words, decide whether and under which additional conditions *de dicto* attitudes entail *de re* attitudes, and vice versa.

Remember that in general, *de dicto* and the respective *de re* attitudes are logically independent, as the following example makes it obvious:

Tom believes that the Pope is not a pope.
Tom believes of the Pope that he is not a pope.

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