A Formally Decidable Crime

This is an in-class homework! Lucky you! Answer the two problems on a separate piece of paper, and hand it in before the end of class. Be sure to write your name on it. You can work together but go off and write the homework up on your own.

A DASTARDLY CRIME AGAINST LOGIC!

“It’s Russell! He’s dead!” cried Alfred Whitehead.
“It appears so,” said Kurt Godel, who remained cautious in his commitments to anything but analytical, logical claims.
All had been going well at the International Conference of Logic, until Godel and Whitehead, arguing about number theory, wandered into the Library to use a blackboard, and promptly stumbled upon the body of Bertrand Russell. Russell lay face down on the ugly carpet, a knife stuck through the back of his tweed coat.
“Call the police!” Whitehead shouted. “Alert the army! Get the busboy in here!”
“You do that,” Godel mumbled, already deep in thought. He bent down and examined the knife handle with grim curiosity. “You do that, while I solve the crime.”

WHITEHEAD FAILS MISERABLY

“Come out in the hall,” Godel said, after Whitehead had made his calls. “It’s too distressing in here.”
The Police station was far away, and the murder of logicians was a low priority, so Godel and Whitehead knew they had some time to think together.
“I know who did it,” Whitehead said as Godel closed the library door. He swatted at the plastic plants in the hallway in frustration.
“Who?”
“The killer was Wittgenstein. For consider, if the killer was Wittgenstein, then Wittgenstein entered the Library. And Wittgenstein entered the Library. I know, because he had a book from the library.”
“Your argument is not valid,” Godel observed. “And so, although Wittgenstein could be the killer, he may also not be the killer.”

PROBLEM 1 (10 points): Symbolize the argument that is underlined and in bold; provide a key for your symbolization; and show it is invalid using a truth table. That means, circle all and only the rows for which the premises are true but the conclusion is false.

GODEL SAVES THE DAY

“No,” Godel said. “I have concluded that the killer was Frege. For: the killer was Frege if both Frege had a motive and Frege had Cantor’s knife. I recognized the knife in Russell’s back: it was the famous knife that Cantor used to divide the cardinal from ordinal numbers, and has long been missing from the Reichsmuseum. This morning, I happened to
observe that Frege had Cantor’s knife. I saw it in his pocket, and meant to alert the police but hesitated -- fearing I might be wrong. Note also that Russell had mailed a description of his paradox to Frege. If Russell had mailed it, then Frege had a motive to kill Russell, for the paradox ruined Frege’s life project.”

PROBLEM 2 (10 points): Symbolize the argument that is underlined and in bold; provide a key; and prove it is valid with a direct proof and using your inference rules.