

Logic puzzle

The following problems are adapted from “What is the Name of this Book : The riddle of Dracula and other logical puzzles.”

- (1) A bank was robbed and Inspector Craig and Sergeant McPherson were on the case trying to establish the guilt or innocence of three suspects Alice, Bob and Carol. The nefarious characters are the only people who could be involved in these bank robberies and at least one of them is guilty. In each case the Inspector and Sergeant establish certain facts.

Write an argument in words to establish the guilt or innocence of Alice, Bob and Carol. Note that the clues provided may not be sufficient to determine the guilt and innocence of all of the suspects, but should be sufficient to establish the guilt of at least one person.

Say that we establish that:

- (w) If Alice was guilty, then she had an accomplice.
- (x) If Bob is innocent, then so is Carol.
- (y) If exactly two are guilty then Alice is one of them.
- (z) If Carol is innocent, then so is Bob.

Translate each of the clues to a truth valued sentence using the connectives *and*, *or*, *not* and *if ... then* and the propositions: *A* representing the statement “Alice is guilty,” *B* representing the statement “Bob is guilty” and *C* representing “Carol is guilty.” Create a truth table establishing the truth values of the clues in terms of the truth values of *A*, *B* and *C*. Use the truth table to help guide you to explain who is guilty and why.