Problems from Smullyan II[1]

Some other kinds of problems you might know are Smullyan's problems of the "Inspector Craig" type.

1. An enormous amount of loot had been stolen from a store. The criminal (or criminals) took the heist away in a car. Three well-known criminals A, B, C were brought to Scotland Yard for questioning. The following facts were ascertained:
   - No one other than A, B, C was involved in the robbery.
   - C never works without A (and possibly others) as an accomplice.
   - B does not know how to drive.

   Is A innocent or guilty?

2. Another robbery. A, B, and C were brought in for questioning and the following facts were found:
   - No one other than A, B, and C was involved.
   - A never works without at least one accomplice.
   - C is innocent.

   Is B innocent or guilty?

3. In this case, the robbery occurred in London. Three well-known criminals A, B, and C were collected for questioning. Now, A and C were identical twins and could not be told apart. Both were timid and would not work without an accomplice. B, on the other hand, was bold and always worked alone. Also, witnesses said that at the time of the robbery, one of the two twins was seen eating ice cream in Dover, but it is not known which twin.

   Again, if no one but A, B, and C are involved in the robbery, which ones are innocent and which are guilty?

4. "What do you make of these three facts?" asked Inspector Craig to Sergeant McPherson.
   - If A is guilty and B is innocent, then C is guilty.
   - C never works alone.
   - A never works with C.
   - No one other than A, B, or C was involved, and at least one of them is guilty.

   The Sergeant scratched his head and said, "Not much, I'm afraid. Can you tell from these facts which are innocent and which are guilty?"

   "No," said Craig, "but there is enough to know that one of them is guilty." Which is it?

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5. Mr. McGregor, a London shopkeeper, phoned the police and said that his shop had been robbed. Three suspects A, B, and C were rounded up for questioning. The following facts were established:
   - Each of the men A, B, C had been in the shop on the day of the robbery, and no one else had been there on that day.
   - If A was guilty, then he had exactly one accomplice.
   - If B is innocent, so is C.
   - If exactly two are guilty, then A is one of them.
   - If C is innocent, so is B.

   Who is guilty?

6. This time four suspects A, B, C, D were rounded up for questioning after a robbery. It is known for sure that at least one of them is guilty and that no one outside the four is involved. The following facts appeared:
   - A was definitely innocent.
   - If B was guilty, then he had exactly one accomplice.
   - If C was guilty, then he had exactly two accomplices.

   Inspector Craig especially wanted to know whether D was guilty, because he was a particularly dangerous criminal. Is D guilty or not?

7. A man was being tried for participation in a robbery. The prosecutor and the defense attorney made the following statements:
   - Prosecutor: If the defendant is guilty, then he had an accomplice.
   - Defense attorney: That's not true!

   Why was this the worst thing the defense attorney could have said?

8. Three men A, B, and C are on trial for participation in a robbery. In this case, the following two facts were established:
   - If A is innocent or B is guilty, then C is guilty.
   - If A is innocent, then C is innocent.

   Can the guilt of any one of the three be established?

HW: In this case, there are four defendants, A, B, C, and D. The following facts are established:

- If A is guilty, then B was an accomplice.
- If B is guilty then either C was an accomplice or A is innocent.
- If D is innocent then A is guilty and C is innocent.
- If D is guilty, so is A.

Which ones are innocent and which are guilty?