

## Problems from Smullyan I<sup>1</sup>

Some famous math problems are about an island of “Knights and Liars,” an island where:

- Everyone is either a knight or a liar.
  - Knights always tell the truth.
  - Liars always lie.
1. Three inhabitants, A, B, and C, were standing together in a garden. A stranger passed by and asked A: “Are you a knight or a liar?” A answered, but quietly so that the stranger could not hear him. Then the stranger asked B: “What did A say?” B replied: “A said that he is a liar.” At this point C said: “Don’t believe B, he is lying.”

What are B and C?

2. In this problem there are only two people, A and B, each of whom is either a knight or a liar. A says: “At least one of us is a liar.”

What are A and B?

3. Suppose A says: “Either I am a liar or B is a knight.” What are A and B?

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<sup>1</sup> These problems have been liberally adapted from Smullyan’s *What is the Name of this Book?*, which possesses more interesting logic puzzles like these than I could conceivably borrow.

4. Again we have three people, A, B, and C, each of whom is either a knight or a liar. A and B make the following statements:

A: All of us are liars.

B: Exactly one of us is a knight.

What are A, B, and C?

5. Suppose instead, A and B say the following:

A: All of us are liars.

B: Exactly one of us is a liar.

Can you determine what B is? Can you determine what C is?

6. Suppose A says, "I am a liar, but B isn't." What are A and B?

7. Two people are said to be "of the same type" if they are both knights or both liars. A and B make the following statements:

A: B is a liar.

B: A and C are of the same type.

What is C?

8. Three people A, B, and C are present. A says: "B and C are of the same type." Someone asks C, "Are A and B of the same type?"

What does C answer?

**Homework:** Invent your own puzzle from the island of "knights and liars!"