The Island of Knights and Knaves

There are two types of inhabitants of our island. Knights, who always tell the truth, and knaves, who always lie.

Warmup

Two of the inhabitants - A and B - were standing together in a garden.

A stranger passed by and asked A, “Are you a knight or a knave?”
A responded ____________________.

But the stranger couldn’t make out what A said, and so he asked B, “What did A say?”
B responded ____________________.

What would A and B’s responses be if…

1. A and B were both knaves

2. A was a knave and B was a knight

   A would lie and say “I am a knight”

   B would tell the truth and say “A said that he’s a knight”

3. A was a knight and B was a knave

4. A and B were both knights
Problem 1

Three of the inhabitants - A, B, and C - were standing together in a garden. A stranger passed by and asked A, “Are you a knight or a knave?” A answered, but rather indistinctly, so the stranger could not make out what he said. The stranger then asked B, “What did A say?” B replied, “A said that he is a knave.” At this point the third man, C, said, “Don’t believe B; he is lying!”

The question is, what are B and C?

Problem 2

Suppose in Problem 1, the stranger, instead of asking A what he is, asked A, “How many knights are among you?” Again A answers indistinctly. So the stranger asks B, “What did A say?” B replies, “A said that there is one knight among us.” Then C says, “Don’t believe B; he is lying!”

Now, what are B and C?

Problem 3

In this problem, there are only two people, A and B, each of whom is either a knight or a knave. A makes the following statement: “At least one of us is a knave.”

What are A and B?

Problem 4

Suppose A says, “Either I am a knave or B is a knight.”

What are A and B?

Problem 5

Suppose A says, “Either I am a knave or else two plus two equals five.”

What would you conclude?
Problem 6

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

   A: All of us are knaves.
   B: Exactly one of us is a knight.

What are A, B, C?

Problem 7

Suppose instead, A and B say the following:

   A: All of us are knaves.
   B: Exactly one of us is a knave.

Can it be determined what B is? Can it be determined what C is?

Problem 8

Suppose A says, “I am a knave, but B isn’t.”

What are A and B?

Problem 9

We again have three inhabitants, A, B, and C, each of whom is a knight or a knave. Two people are said to be of the same type if they are both knights or both knaves. A and B make the following statements:

   A: B is a knave.
   B: A and C are of the same type.

What is C?