Algebraic and Discrete Methods in Biology

Practical Problems to Propositional Logic

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Aladdin and the two trunks

Aladdin finds two trunks *A* and *B* in a cave. He knows that each of them either contains a treasure or a fatal trap.

On trunk *A* is written:
At least one of these two trunks contains a treasure.

On trunk *B* is written:
In A there is a fatal trap.

Aladdin knows that either both the inscriptions are true, or they are both false. Can Aladdin choose a trunk being sure that he will find a treasure?
If this is the case, which trunk should he open?

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The three friends

Suppose we know that:

If Paula is thin, then Charlotte is not blonde or Robert is not tall.

If Robert is tall then Alex is lovely.

If Alex is lovely and Charlotte is blonde then Paula is thin.

Charlotte is blonde.

Can we deduce that *Robert is not tall*?

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The golden box

Three boxes are presented.
One contains gold, the other two are empty.
Each box has imprinted on it a clue as to its contents; the clues are:

Box 1: *The gold is not here.*

Box 2: *The gold is not here.*

Box 3: *The gold is in Box 2.*

Only one message is true; the other two are false.
Which box has the gold?

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The Labyrinth Guardians

Walking in a labyrinth in front of you there are three possible roads: the left one is paved with gold, the one in front of you is paved with marble, the right one is made of small stones. Each street is protected by a guardian and they are telling you:

The guardian of the gold street:
This road will bring you straight to the center. Moreover, if the stones take you to the center, then also the marble takes you to the center.

The guardian of the marble street:
Neither the gold nor the stones will take you to the center.

The guardian of the stone street:
Follow the gold and you will reach the center, follow the marble and you will be lost.

Given that all the guardians are liars, can you choose a road being sure that it will lead you to the center of the labyrinth?
If this is the case, which road do you choose?

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