

# Tutorial 4 – Contd.

## *Foundations of Computing Science*

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# Questions

1. There are three suspects for a murder: Adams, Brown and Clark.

Adams says “I didn’t do it. The victim was an old acquaintance of Brown’s. But Clark hated him.”

Brown states “I didn’t do it. I didn’t even know the guy. Besides I was out of town all that week.”

Clark says “I didn’t do it. I saw both Adams and Brown downtown with the victim that day; one of them must have done it.”

Assume that the two innocent men are telling the truth, but that the guilty man might not be. Who did it?

## 2. Let's consider a propositional language where

A = "Angelo comes to the party",

B = "Bruno comes to the party",

C = "Carlo comes to the party",

D = "David comes to the party".

Formalize the following sentences:

- a) "If David comes to the party then Bruno and Carlo come too"
- b) "Carlo comes to the party only if Angelo and Bruno do not come"
- c) "David comes to the party if and only if Carlo comes and Angelo doesn't come"
- d) "If David comes to the party, then, if Carlo doesn't come then Angelo comes"
- e) "Carlo comes to the party provided that David doesn't come, but, if David comes, then Bruno doesn't come"
- f) "A necessary condition for Angelo coming to the party, is that, if Bruno and Carlo aren't coming, David comes"
- g) "Angelo, Bruno and Carlo come to the party if and only if David doesn't come, but, if neither Angelo nor Bruno come, then David comes only if Carlo comes"

**3. You are walking in a labyrinth and all of a sudden you find yourself in front of three possible roads: the road on your left is paved with gold, the one in front of you is paved with marble, while the one on your right is made of small stones. Each street is protected by a guardian. You talk to the guardians and this is what they tell you:**

- The guardian of the gold street: “This road will bring you straight to the centre. Moreover, if the stones take you to the centre, then also the**
- marble takes you to the centre.”**
- The guardian of the marble street: “Neither the gold nor the stones will take you to the centre.”**
- The guardian of the stone street: “Follow the gold and you’ll reach the centre, follow the marble and you will be lost.”**

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

**Provide a propositional language and a set of axioms that formalize the problem and show whether you can choose a road being sure it will lead to the center.**