



Reasoning and Formal Modelling for Forensic Science
2010/2011; 2nd Semester
Prof. Dr. Benedikt Löwe

Homework Set # 2

Deadline: 23 February 2011

Homework can be handed in

- (1) in class at the beginning of the lecture (3pm) or
- (2) *via* e-mail to N.P.M.Carl@uva.nl until 3pm.

Late homework will not be accepted.

Exercise D (6 points).

In the lecture, we encountered four so-called *perfect syllogisms*:

BARBARA	DARII
Every B is A	Every B is A
Every C is B	Some C is B
<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>
Every C is A	Some C is A
CELARENT	FERIO
No B is A	No B is A
Every C is B	Some C is B
<hr style="width: 100%; border: 0.5px solid black;"/>	<hr style="width: 100%; border: 0.5px solid black;"/>
No C is A	Some C is not A

In the following list of six arguments, one is of the form **BARBARA**, one of the form **DARII**, one of the form **CELARENT**, one of the form **FERIO**, one is an invalid syllogism, and one is of none of the four mentioned forms but valid. Identify them. (Note that some of the quantified phrases are symmetric: if “No X is Y ” then “No Y is X ”, but others are not!)

- (1) There is no policeman who ever commits a crime. Some politicians are criminals. Therefore, there must be politicians who are not policemen.
- (2) All cats are lazy. I own a lion cub that is jumping up and down all the time: certainly not lazy. Therefore, there is at least one lion which is not a cat.
- (3) All women are actresses, but all actresses must be beautiful. Therefore, all women are beautiful.
- (4) All Greeks were philosophers. George Washington, the first president of the United States was really a Greek citizen (even though no one seems to know that). Therefore, there was some American president who was a philosopher.
- (5) No human being is older than 130 years old. There is some animal that is older than 130 years old. Therefore, all humans are animals.
- (6) No human being is older than 130 years old. Every tooth fairy is older than 130 years old. Therefore, no human being is at the same time a tooth fairy.

Exercise E (5 points).

In the lecture, we gave an argument that the perfect syllogism called **CELARENT** above is valid (Lecture 14, slide entitled “Proving that a mood is valid (2)”). Provide a similar argument for the perfect syllogism called **FERIO** (see **Exercise D**).

Exercise F (6 points).

The following arguments are invalid. Show that they are by following the algorithm from the lecture (Lecture 4, slide entitled “Proving that a mood is invalid”):

$$\frac{\text{Some } A \text{ is } B. \quad \text{All } B \text{ are } A.}{\text{All } A \text{ are } C.} \quad \frac{\text{Some } C \text{ is not } B. \quad \text{All } B \text{ are } C.}{\text{Some } A \text{ is not } C.}$$

Exercise G (8 points).

(From an actual police report, 16 Feb 2011, Colorado Springs, U.S.A.):

A 24 year old female had stabbed her 25 year old boyfriend with a knife. The Domestic Violence Unit responded and assumed investigation of the call. The investigation revealed that the female had been beaten and strangled by her boyfriend. The female was able to get away from her boyfriend and grabbed a knife, stabbing him in the arm. The male did not suffer life threatening injuries. Both parties were taken to a local hospital where they were treated and released. The male was arrested for Second Degree Assault and various other charges. Investigation is ongoing.

Provide a *controlled situation* for this police report, using the individuals f (for the female), m (for the male) and d (for the Domestic Violence Unit) and using the properties W (for “wounded”), H (for “hospitalized”) and A (for “arrested”). Give a complete description of the properties and who has which property.

Use your controlled situation to evaluate the truth or falsity of the following statements (give a little bit of argument for each one):

- (1) Some wounded person was not arrested.
- (2) Everyone is wounded and no one was arrested.
- (3) All wounded people were hospitalized.
- (4) All hospitalized people were either wounded or arrested.