## Multi-Agent Systems

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## Exercise Sheet 7 Due: July 3rd, 2017, 10:00

## **Exercise 7.1** (Deontic Logics, 2+1+1+3)

Consider the following situation you are asked to formalize within the Leibnizian-Kangerian-Andersonian logic (LKA):

There is an autonomous car that is on a collision course with a pedestrian. If an evasive action is taken, the pedestrian will stay alive, but it is possible (yet not necessary) that the passenger dies. If no action is taken, the pedestrian will die and the passenger will survive with certainty. The car's decision algorithm decides for the evasive action. The legislator's specification for situations like this is that the car has to make sure that neither the passenger nor the pedestrian will die with certainty.

- (a) Formalize the car's situation as LKA-formulas.
- (b) Formalize the car's decision as LKA-formulas.
- (c) Formalize the legislator's specification as LKA-formulas.
- (d) Prove that the car's decision fulfills the specification.

**Exercise 7.2** (Argumentation Frameworks, 2+3+3) Consider the following argumentation framework:



- (a) Generate the grounded labeling using the grounded labeling algorithm.
- (b) List all complete labelings. Identify all stable and preferred labelings.
- (c) Use admissible discussions to verify that
  - *e* is in the **in** set of some preferred labeling,
  - *d* is in the **in** set of some preferred labeling,
  - c is in the **in** set of some preferred labeling,
  - b is not in the **in** set of any preferred labeling, and
  - *a* is in the **in** set of some preferred labeling.