Computationele logica

Kamans, Jim 10302905
Roosingh, Sander 11983957
Schenk, Stefan 11881798

November 2017

1 Exercise 1: Singapore problem

(a) one

(b) two

(c) three

(d) four

(e) five

2 Exercise 2

Prove formally that, for every sentence φ, the sentence

$$\neg K_a \varphi \Rightarrow K_a \neg K_a \varphi$$

(expressing "Negative Introspection of Knowledge") is *valid* on (the family of all) **epistemic** models.

Let $M = \{W, R_a, R_b, \ldots, \nu\}$ be any epistemic model and let $w \in W$ be any world in it.

To prove the claim, suppose that $\neg K_a \varphi$ is true at w, i.e.

$$w \models_M \neg K_a \varphi. \tag{1}$$

We need to prove that

$$w \models_M K_a \neg K_a \varphi. \tag{?}$$

Let v be an arbitrary world such that $w R_a v$. By the semantics of K_a, (1) implies

3 Exercise 3

Using the semantics of knowledge K_a and common knowledge Ck, show that the following is NOT valid on *epistemic models with (only) 2 agents a and b:*

$$(K_a K_b \phi \wedge K_b K_a \psi) \Rightarrow Ck(\phi \wedge \psi)$$