

# Logic and Symbolic Robotics

## Exercise Week 6

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March 13, 2005

1. Consider the FOL-FC-ASK algorithm from Page 282. Let KB contain the following sentences:

$$\alpha(C) \wedge \gamma(C), \beta(C), \alpha(x) \wedge \beta(x) \wedge \gamma(x) \Rightarrow \delta(x)$$

Explain that the algorithm can not find the required answer to the query  $\exists x \delta(x)$ . How can this bug be circumvented?

2. Make exercise 9.2.
3. Make exercise 9.3.
4. Make exercise 9.9.
5. Make exercise 9.9. but now, do not consider (f.).
  - (a) After how many iterations of forward chaining in the style of Figure 9.7, a fixed point is reached?
  - (b) Give the fixed point.
  - (c) Describe what happens if we are also to consider (f.).
6. Find a  $\theta_1$  a  $\theta_2$  and a formula  $\varphi$  such that  $\text{SUBST}(\text{COMPOSE}(\theta_1, \theta_2), \varphi) \neq \text{SUBST}(\text{COMPOSE}(\theta_2, \theta_1), \varphi)$ .
7. Make Exercise 9. 10, a-c
8. Make Exercise 9. 11
9. Make Exercise 9. 12
10. Make Exercise 9. 13