

Principles of AI Planning

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SS 2005

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Exercise Sheet 7

To be submitted Monday, June 6

Exercise 7.1 (Existential Abstraction – 5 credits)

Construct, by using existential abstraction, the formula that represents the product of the 4×4 matrices represented by the following formulae.

$$\begin{aligned}\phi_1 &= a \leftrightarrow a' \\ \phi_2 &= (\neg a \leftrightarrow a') \wedge (\neg b \leftrightarrow b')\end{aligned}$$

Also give the matrices in the conventional tabular form.

Exercise 7.2 (Strong Preimage – 5 credits)

Consider the transition relation $\{(01, 00), (01, 01), (10, 10)\}$ represented by the formula

$$((a \leftrightarrow \neg b) \wedge (a \leftrightarrow a') \wedge (b \leftrightarrow b')) \vee (\neg a \wedge b \wedge \neg a' \wedge \neg b')$$

and the set $\{01, 10\}$ of states represented by $a \leftrightarrow \neg b$.

Compute the *strong preimage* of the set of states with respect to the transition relation by means of universal and existential abstraction as presented in the lecture. Simplify the resulting formula as much as possible.

You may work on these assignments and submit your results **in groups of two students**. Make sure to clearly indicate both names on your work. **You may write your answers in English or German**. Please return your homework on monday **before** 14:15.

Exercise marks count towards your final grade for this course, which is calculated from exercise marks (**15%**) and exam marks (**85%**).