Formal Models SS 2018: Assignment 9

Institute for Formal Models and Verification, JKU Linz

Due 07.06.2018

To indicate that you solved an exercise and that you can present it in the exercise group, tick it off in our MOODLE course until **8am on the day of the exercise**. Unmarking and marking exercises at the begin of the exercise class is **not** possible.

Exercise 33 Draw a computation tree for each of the following CTL formulas.

1. **EF** p 2. **EX** p 3. **EG** p
4. **AX** p 5. **A**$[p\ \mathbf{U}\ q]$ 6. **E**$[p\ \mathbf{U}\ q]$

Exercise 34

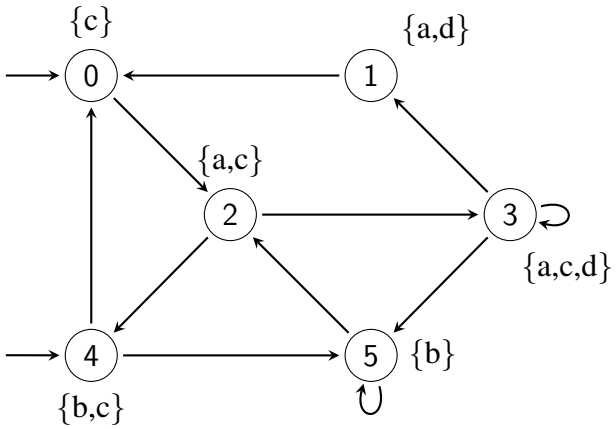
Given Kripke structure K as shown below. Which of the following CTL formulas hold in K?

a) **AG** $(\neg a \rightarrow c)$

b) **E** $((c \vee d)\ \mathbf{U}\ b)$

c) **AG** $((c \wedge d) \rightarrow \mathbf{EX}\ a)$

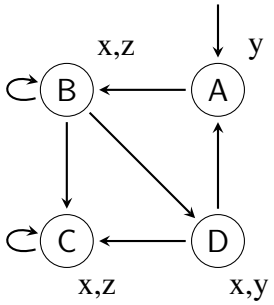
d) **EF** $((a \wedge \neg c) \rightarrow \mathbf{EX}\ c)$



Exercise 35

Given trace π in Kripke structure on the right and LTL formula f. Decide if f holds in π, i.e., $\pi \models f$.

Trace π	Formula f	yes	no
$(A,B,D)^\omega$	$\mathbf{GF}(\mathsf{x})$	☐	☐
$A,B,(C)^\omega$	$\mathbf{GF}(\mathsf{y})$	☐	☐
$A,(B)^\omega$	$\mathbf{FG}(\mathsf{x})$	☐	☐
$(A,B,D)^\omega$	$(\mathsf{x}\,\mathbf{U}\,\mathsf{y})$	☐	☐
$(B,D,A)^\omega$	$(\mathsf{x}\,\mathbf{U}\,\mathsf{y})$	☐	☐
$(A,B,D)^\omega$	$\mathbf{G}(\mathsf{y} \vee \mathbf{X}\mathsf{x})$	☐	☐



Exercise 36

Find a Kripke structure K such that $K \not\models AFAGp$, but $K \models FGp$ (hint: lecture video).