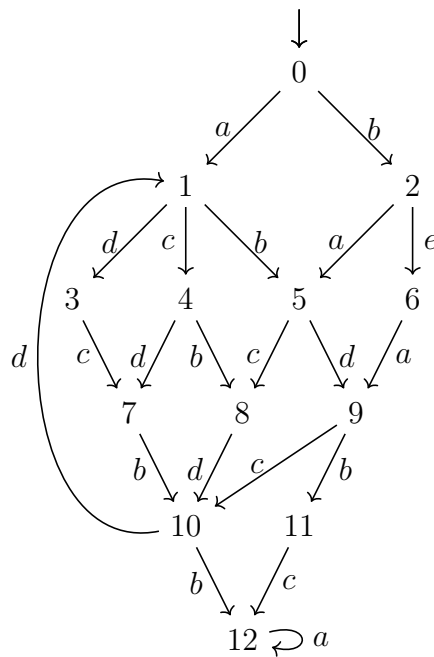


## Model Checking – Exercise sheet 6

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### Exercise 6.1

Consider the following Kripke structure  $\mathcal{K} = (S, A, \rightarrow, 0, AP, \nu)$ , where  $A = \{a, b, c, d, e\}$ ,  $AP = \{p\}$ ,  $\nu(6) = \{p\}$ , and  $\nu(s) = \emptyset$  if  $s \neq 6$ .



- (a) Write down the maximal independence relation  $I \subseteq A \times A$ .
- (b) Write down the maximal invisibility set  $U \subseteq A$ .
- (c) Compute a reduction function  $red$  that satisfies the ample set conditions C0–C3. Whenever possible, choose  $red(s)$  such that it is a proper subset of  $en(s)$ , for each state  $s$ .
- (d) Use  $red$  to construct a reduced Kripke structure  $\mathcal{K}'$  that is stuttering equivalent to the original Kripke structure  $\mathcal{K}$ .

**Solution 6.1**

(a)  $I = \{ (a, b), (a, c), (a, d), (b, c), (b, e), (c, d), (c, e), (d, e), (b, a), (c, a), (d, a), (c, b), (e, b), (d, c), (e, c), (e, d) \}$

(b)  $U = \{b, c, d\}$

(c)  $red(0) = \{a, b\}, red(1) = \{c\}, red(2) = \{a, e\}, red(5) = \{d\}, red(4) = \{b, d\}, red(6) = \{a\}, red(7) = \{b\}, red(8) = \{d\}, red(9) = \{c\}, red(10) = \{b\}, red(12) = \{a\},$

(d)

