First exercise sheet for the lecture

XML and Programming Languages

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Exercise 1
We have abstractly modeled DTDs in the lecture. The "actual" DTDs used for XML are restricted to use *deterministic* regular expressions. A regular expression is deterministic if the FSA built from it using the construction in the lecture has no two transitions (q, σ, q') and (q, σ, q'') with $q' \neq q''$.

Which of the following regular expressions are deterministic?

1. $(a|b)^*a$

2. $(a|b)^*a(a|b)$

3. $c(a|b(\epsilon|cc))^*$

4. $a^*(bca^*)^*$

5. $(a|b)^*(ac|bd)$ ◇

Exercise 2
In practice, DTDs are also restricted in that their regular expressions must not contain $\emptyset$.

Is it always possible, for a given DTD, to give a semantically equivalent DTD that is $\emptyset$-free? ◇

Exercise 3
Let d be the DTD (r, P) with $P = \{r \to a^*,\ a \to b|c,\ b \to \epsilon,\ c \to \epsilon\}$.

Is $\mathcal{L}(d)$ regular? ◇