Homework for lecture
Automata and Formal Languages II

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Aufgabe 4.1. [**Construction of DFTA**] (10 points)
(TATA Ex. 1.8) Given the alphabet $or/2, and/2, not/1, true, false, x.$ representing Boolean formula over variable x.

1. Specify a DFTA that recognizes the set of satisfiable formulas.
2. Extend the alphabet to variables $x_1, \ldots, x_n$. Again, specify a DFTA that recognizes the set of satisfiable formulas.

Aufgabe 4.2. [**Leaf language**] (10 points)
Consider a nondeterministic word automaton $\mathcal{A} = (Q, \Sigma, I, Q_f, D)$ with states Q, alphabet Σ, initial states I, final states Q_f and rules D. Consider the tree alphabet $\mathcal{F} = f/2, x/0 \; for \; x \in \Sigma$. We define a function $flat : T(\mathcal{F}) \to \Sigma^*$, which returns the string of leafs, in left to right order:

$$flat(x) = x$$
$$flat(f(t_1, t_2)) = flat(t_1)flat(t_2)$$

Construct an NFTA that accepts the language $L = \{t \mid flat(t) \in L(\mathcal{A})\}$. Prove your construction correct.