

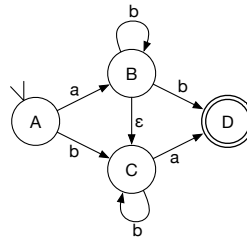
CS 314 Fall 2018

Homework Assignment 2

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Due Wednesday, October 10, 3:00 AM

1. Convert this NFA to a DFA. Clearly indicate the set of NFA states that each state in the DFA corresponds to.



2. Reduce the following lambda terms to normal form, or argue that no normal form exists.

- (a) $(\lambda a. \lambda b. a)xyz$
- (b) $\lambda x. (\lambda y. y)(\lambda z. z)x$
- (c) $(\lambda x. \lambda y. xyy)(yz)x$
- (d) $(\lambda a. (\lambda b. a(bb))(\lambda c. a(cc)))s$
- (e) $(\lambda a. \lambda b. a)(\lambda c. c)xyz$

3. Assume the following definitions:

$$\text{TRUE} = \lambda t. \lambda f. t \quad (1)$$

$$\text{FALSE} = \lambda t. \lambda f. f \quad (2)$$

Using these definitions, we can define terms such as NOT that behave in the expected way, e.g.,

$$\text{NOT} = \lambda b. \lambda t. \lambda f. bft \quad (3)$$

Note that NOT TRUE = FALSE.

Define the following terms and briefly explain how they work.

- (a) AND
- (b) OR
- (c) XOR