

## CS3311 Homework 9

Due date: Tuesday, November 6, 2018, 11:59pm

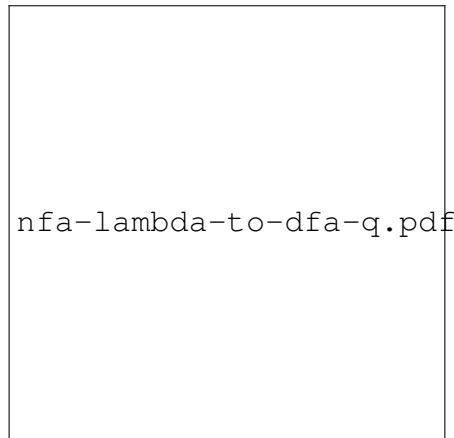
Submission: Typed, pdf on Canvas (scanned submissions are not allowed)

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The answers must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in the class. Any other source must be specified clearly.

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1. (20+30 points) Let  $M$  be the following NFA- $\lambda$ :



(a) Give the input transition function (t) for  $M$  in tabular form. Include a column for the  $\lambda$ -closure of each state. Remember that each state is a member of its  $\lambda$ -closure.

this is the transition function(not the input transition function)

$\delta$	a	b	$\lambda$
$q_0$	$q_0$	$\emptyset$	$q_1, q_3$
$q_1$	$q_2$	$q_4$	$\emptyset$
$q_2$	$\emptyset$	$q_1$	$\emptyset$
$q_3$	$q_4$	$q_3$	$\emptyset$
$q_4$	$\emptyset$	$\emptyset$	$\emptyset$

this is the  $\lambda$ -transition

' $\lambda$ -closure'	$\lambda$ -closure
$q_0$	$q_0, q_1, q_3$
$q_1$	$q_1$
$q_2$	$q_2$
$q_3$	$q_3$
$q_4$	$q_4$

this is the input transition

$t$	a	b
$q_0$	$q_0, q_1, q_2, q_3, q_4$	$q_3, q_4$
$q_1$	$q_2$	$q_4$
$q_2$	$\emptyset$	$q_1$
$q_3$	$q_4$	$q_3$
$q_4$	$\emptyset$	$\emptyset$

(b) Construct a state diagram of a DFA that is equivalent to  $M$ . Give the transition function and draw the state diagram of the equivalent DFA.

this is the transition function(not the input transition function)

' '	a	b	
$q_0$	$q_0$	$\emptyset$	$q_0, q_1, q_3$
$q_1$	$q_2$	$q_4$	$q_1$
$q_2$	$\emptyset$	$q_1$	$q_2$
$q_3$	$q_4$	$q_3$	$q_3$
$q_4$	$\emptyset$	$\emptyset$	$q_4$

2. (30+20 points) Consider the DFA below.



(a) Construct a two dimensional table where the row and column headers are the states of the above DFA. Mark each cell with a '1' (or a higher number representing the iteration number) if the states are "different." Unmarked cells will represent indistinguishable states.

(b) Construct a minimized DFA by collapsing (groups of) indistinguishable states into single states.