

**COT 4210 Homework #1: Sections 1.1, 1.2**  
**Assigned: 8/20/2024**  
**Due Date/Time: On Webcourses**

1) Draw the state diagram for the DFA formally described below:

$\{Q, \Sigma, \delta, q_0, F\}$  where

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

$\Sigma = \{0, 1\}$

Start state =  $q_0$

$F = \{q_0, q_3\}$

$\delta =$

	0	1
$q_0$	$q_2$	$q_1$
$q_1$	$q_1$	$q_3$
$q_2$	$q_4$	$q_1$
$q_3$	$q_2$	$q_4$
$q_4$	$q_2$	$q_4$

2) Draw a DFA over the alphabet  $\{ 'a', 'b', 'c' \}$  that accepts the following language:

$\{ w \mid w \text{ has exactly 1 occurrence of the letter 'c' } \}$

3) Draw a DFA over the alphabet  $\{0, 1\}$  that accepts the following language:

$\{ w \mid w \text{ does NOT contain the substring 000 or the substring 111 } \}$

4) Draw a DFA over the alphabet  $\{0, 1\}$  that accepts the following language:

$\{ w \mid w, \text{ when interpreted in binary is divisible by 32 } \}$

Hint: due to the special nature of the modulus, 32 states are NOT necessary!

5) Draw a NFA over the alphabet  $\{ 'e', 'n', 'd' \}$  that accepts the following language:

$\{ w \mid w \text{ ends with the substring "end". } \}$

6) Draw a NFA over the alphabet  $\{0, 1\}$  that accepts the following language:

$\{ w \mid w \text{ starts with 0 and ends with 1 } \}$