ICT600 Quiz:
Automata

Instruction: Read each question carefully. Write **all** your works in the space provided. You won't get full credits even when your answer is right without your works all written down. You may use the back of the paper to continue your work. If you do so, write "continued on next page" or so to indicate that that is not the end of your solution. **This is NOT a group work.** You have to do it yourself.

Name:..... ID:.....

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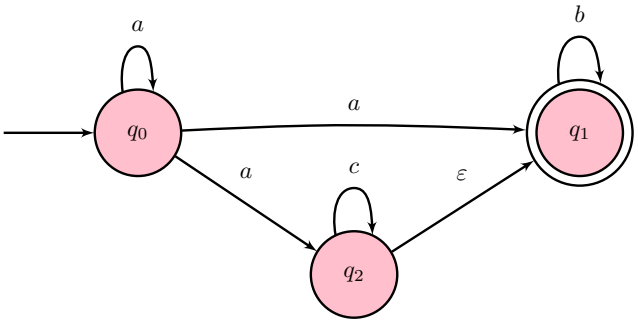
1. Convert the following NFA to an equivalent DFA.



Solution DFA $M = (Q, \sum, \delta, q_0, F)$, where

(a) $Q =$ $\{\phi, \{q_0\}, \{q_1\}, \{q_2\}, \{q_0, q_1\}, \{q_0, q_2\}, \{q_1, q_2\}, \{q_0, q_1, q_2\}\}$

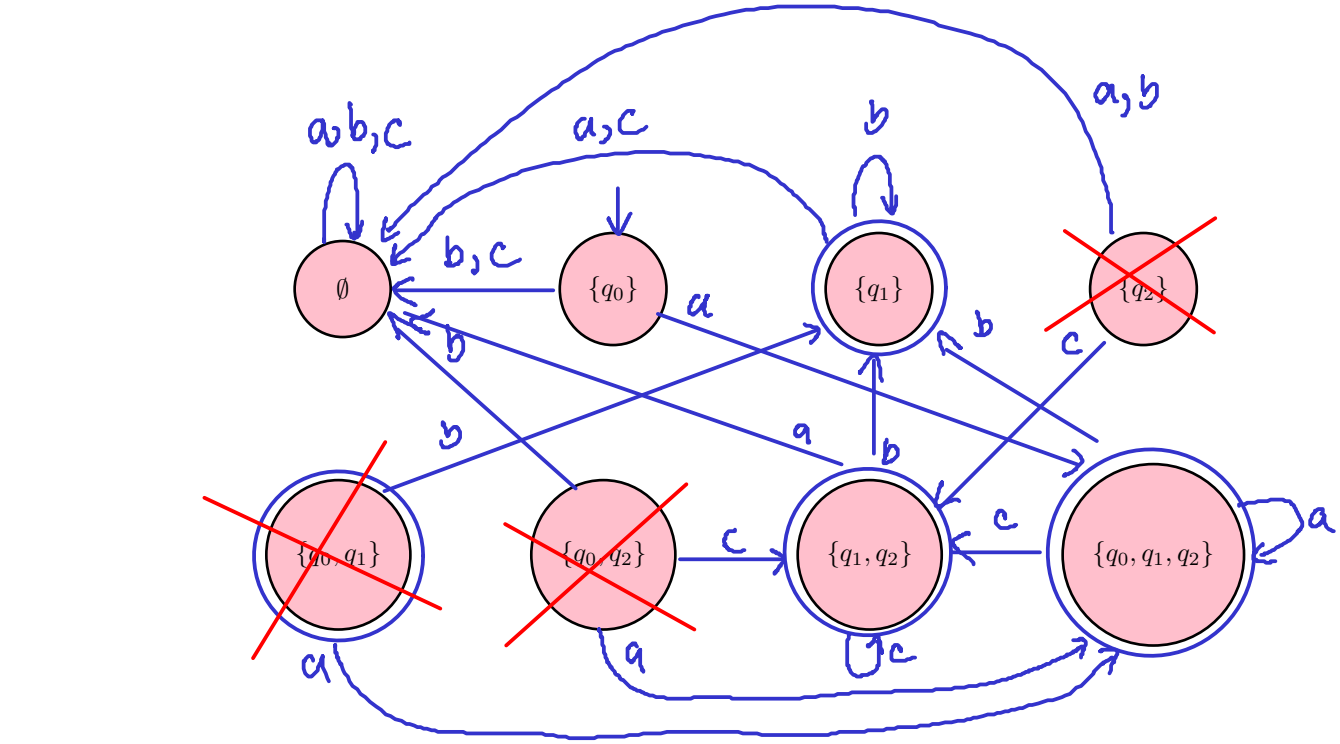
(b) $\sum =$ $\{a, b, c\}$

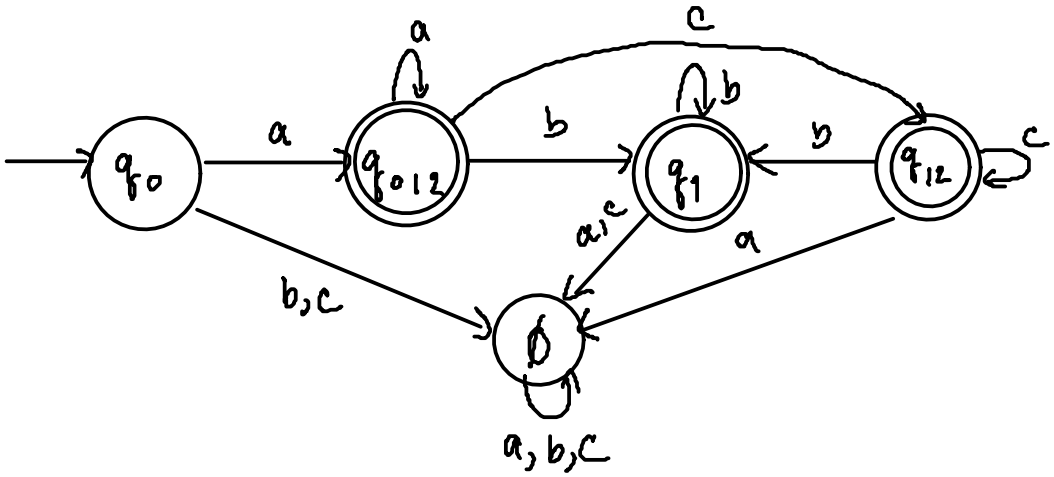
(c) δ is described as

δ	a	b	c
$\emptyset$	ϕ	ϕ	ϕ
$\{q_0\}$	$\{q_0, q_1, q_2\}$	ϕ	ϕ
$\{q_1\}$	ϕ	$\{q_1\}$	ϕ
$\{q_2\}$	ϕ	ϕ	$\{q_1, q_2\}$
$\{q_0, q_1\}$	$\{q_0, q_1, q_2\}$	$\{q_1\}$	ϕ
$\{q_0, q_2\}$	$\{q_0, q_1, q_2\}$	ϕ	$\{q_1, q_2\}$
$\{q_1, q_2\}$	ϕ	$\{q_1\}$	$\{q_1, q_2\}$
$\{q_0, q_1, q_2\}$	$\{q_0, q_1, q_2\}$	$\{q_1\}$	$\{q_1, q_2\}$

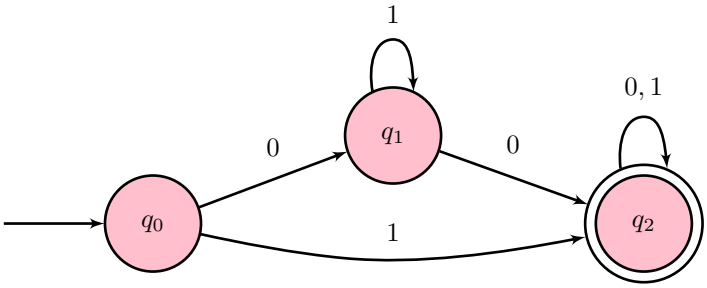
(d) Start state is $\{q_0\}$

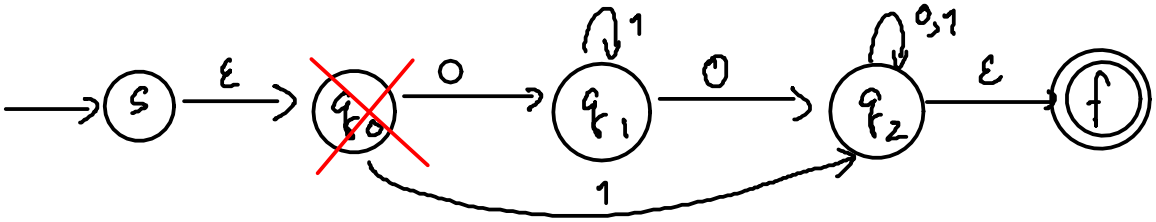
(e) Final states are $\{q_1\}, \{q_0, q_1\}, \{q_1, q_2\}, \{q_0, q_1, q_2\}$

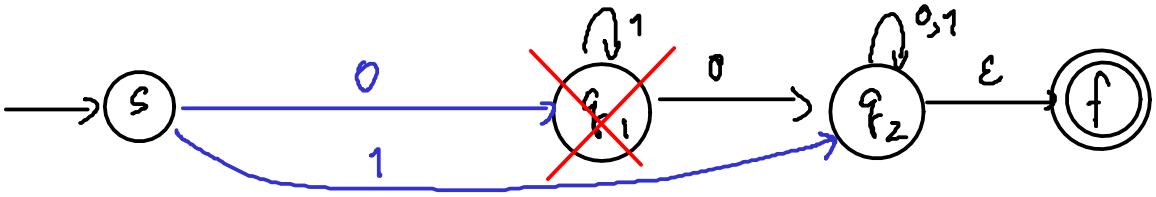

a,b,c
a,c
b
a,b
b,c
∅
{q0}
{q1}
{q2}
a
b
c
{q0, q1}
{q0, q2}
{q1, q2}
{q0, q1, q2}

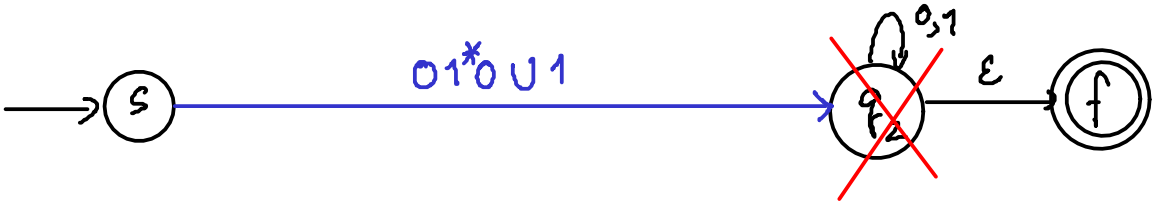

a
c
b
q0
a
q012
b
q1
b
q12
c
a,c
a
b,c
∅
a,b,c

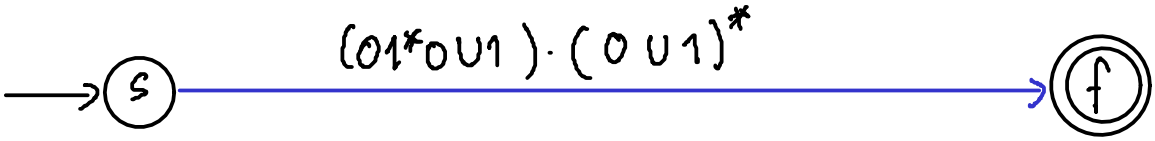
2. Convert the following NFA to a regular expression











3. Convert $10^*(1 \cup 10)$ to an NFA.