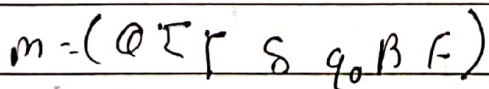


1

Repeat this till all a 's & b 's replaced by α & β

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$$\tau = \{0, 1\}$$
$$\Gamma = \{0, 1, d, \beta, \beta\}$$

Transition table

	Γ	0	1	a	B	β
q_0		$q_1 a R$	$q_1 b R$	$q_0 a R$	-	-
q_1		$q_1 a R$	$q_1 b R$	$q_1 a R$	$q_1 \beta R$	$q_2 BL$
q_2		$q_3 a L$	-	$q_2 a L$	$q_2 \beta L$	$q_n BN$
q_3		$q_3 a L$	$q_3 a L$	$q_3 d L$	-	$q_0 \beta R$
q_4		$q_4 a R$	$q_4 b R$	$q_4 a R$	-	$q_5 \beta L$
q_5		-	$q_6 \beta L$	$q_5 d L$	-	ϵ
q_6		$q_0 a L$	$q_0 b L$	$q_0 d L$	$q_0 \beta L$	$q_1 R$

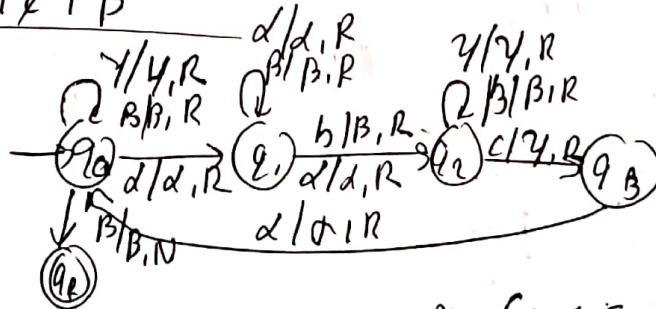
- Q3] Logic: Replace a by d and move right in search of b. Replace b by β and search for c. replace c by γ and move left in search of d. After all replacements move right in search of β to reach final state.

Initial config: $n=2$
 $a \quad a \quad \beta \quad \gamma \quad \gamma$

$| \beta | a | a | b | b | a | \epsilon | \beta$

q_0

Transition diagram:



	a	b	c	d	β	β
q_0	$q_1 a R$	-	-	-	$q_0 \beta R$	$q_n \beta R$
q_1	$q_1 a R$	$q_1 \beta R$	-	$q_1 \beta R$	-	-
q_2	-	$q_2 \beta R$	$q_2 \beta R$	-	-	-
q_3	$q_3 a L$	$q_3 b L$	-	$q_0 a R$	$q_1 \beta L$	-

$$M = (Q, \Sigma, \Gamma, \delta, q_0, \beta, F)$$

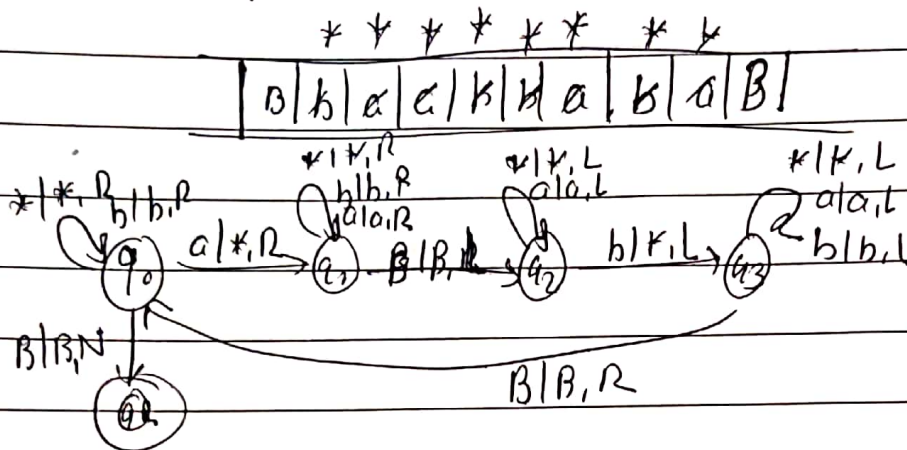
$$Q = \{q_0, q_1, q_2, q_3, q_n\}$$

$$\Sigma = \{a, b, c\}$$

$$\Gamma = \{a, b, c, d, \beta, \gamma, \beta\}$$

$$F = \{q_n\}$$

Q 5] Logic: Search for 'a' moving in right direction. Replace 'a' by * move towards extreme right B. From there move left in search of 'b' replace 'b' by star and move to extreme left B. repeat above procedure until all B's are replaced by *.



Transition table

	a	b	*	B
q_0	$(q_1, *R)$	(q_0, b, R)	(q_0, k, R)	(q_R, BN)
q_1	(q_1, a, R)	(q_1, b, R)	$(q_1, *R)$	(q_1, b, L)
q_2	(q_2, a, L)	$(q_3, *L)$	(q_2, k, L)	—
q_3	(q_3, a, L)	(q_3, b, L)	$(q_3, *L)$	(q_0, BR)

$M = (Q, \Sigma, \Gamma, \delta, q_0, \beta, f)$

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

$\Sigma = \{a, b\}$

$\Gamma = \{a, b, *, B\}$

$F = \{q_R\}$