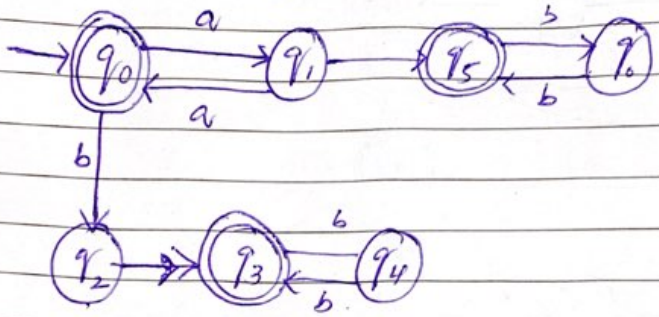
ASSIGNMENT # 01

Date: _____

Basil Ali Khan
20K-0477

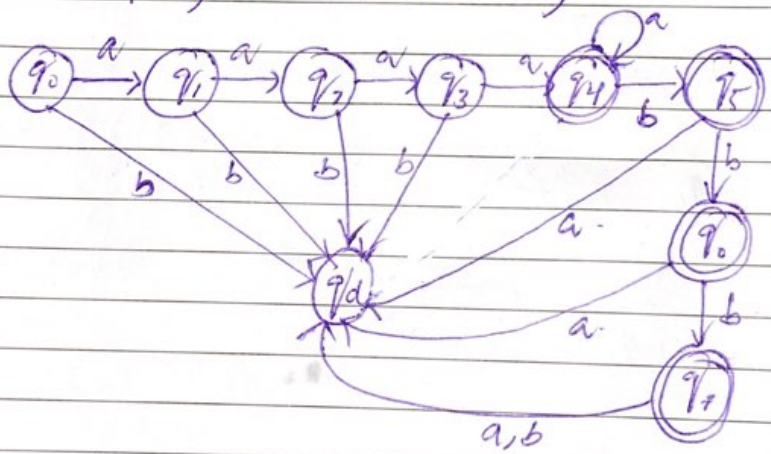
$L_1 = \{ a^n b^m \mid m+n \text{ is even} \}$.

$r = a(aa)^*.b(bb)^* + (aa)^*.(bb)^*$



$L_2 = \{ a^n b^m, n \geq 4, m \leq 3 \}$.

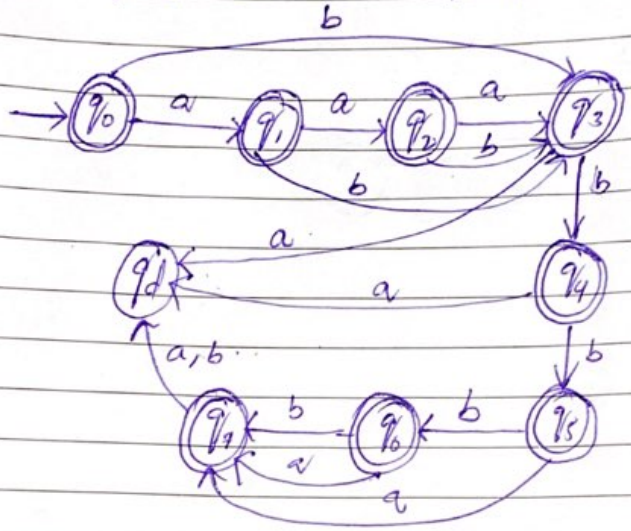
$r = aaaa(a^*)(\varepsilon + b + bb + bbb)$.



Date: _____

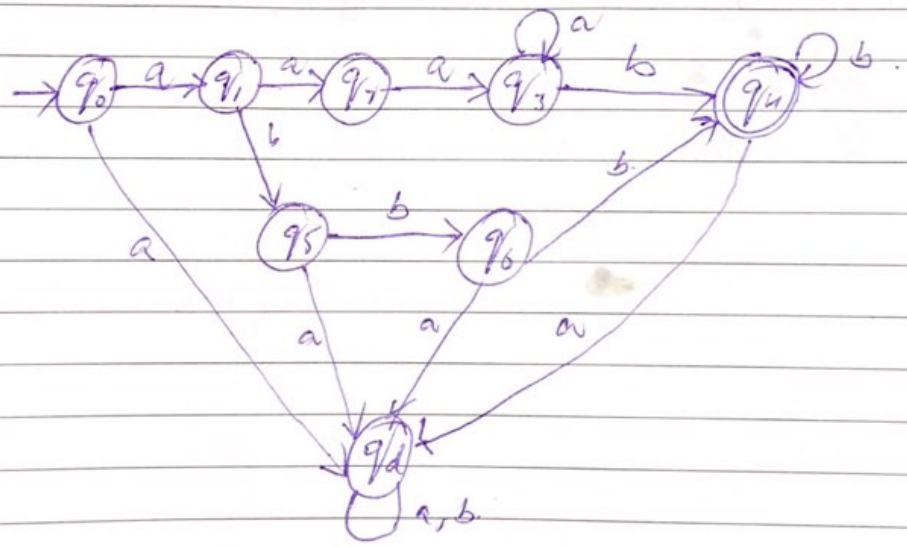
$L_3 = \{ a^n b^m,\ n < 4,\ m \leq 4 \}$

$r = (\varepsilon + a + aa + aaa) \cdot (\varepsilon + b + bb + bbb + bbbb)$



$L_4 = \{ a^n b^m : n \geq 1,\ m \geq 1,\ nm \geq 3 \}$.

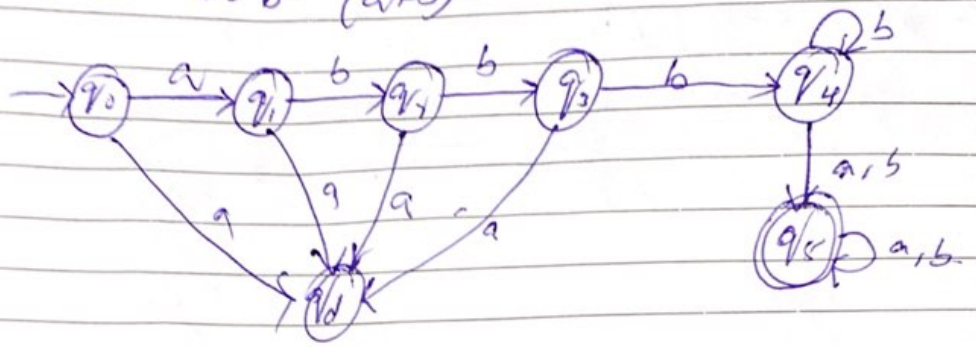
$r = a\,bbbb^* + aaaa^*b\,b^*$



Date: _____

$L_5 = \{ab^n w : n \geq 3, w \in \{a, b\}^+\}$

$r = ab^3b^*(a+b)^*$

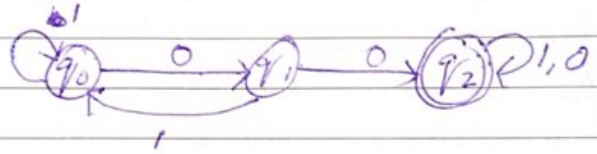


$L_6 = \{vwv : v, w \in \{a, b\}^+, |v| = 2\}$

$r = v \cdot (a+b)^* \cdot v$

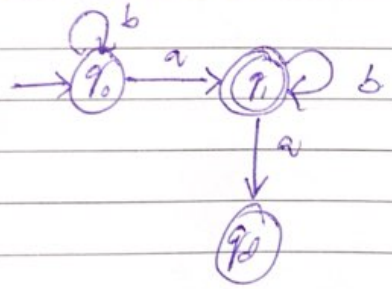
L_7 = having exactly one pair of consecutive zeros.

$r = (1+01)^* 00 (1+10)^*$



L_8 = having exactly one a.

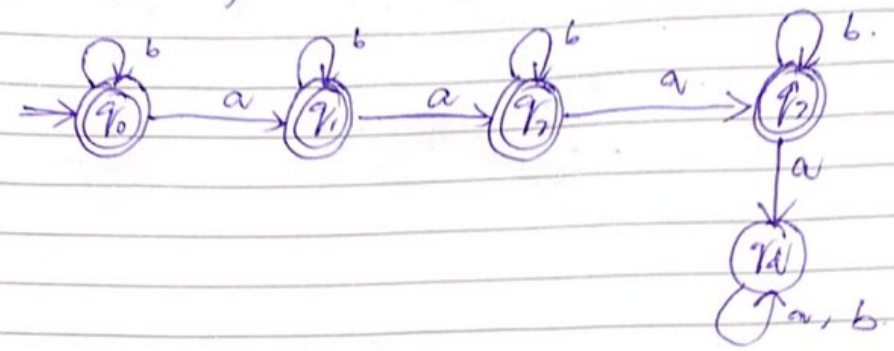
$r = b^* a b^*$



Date:

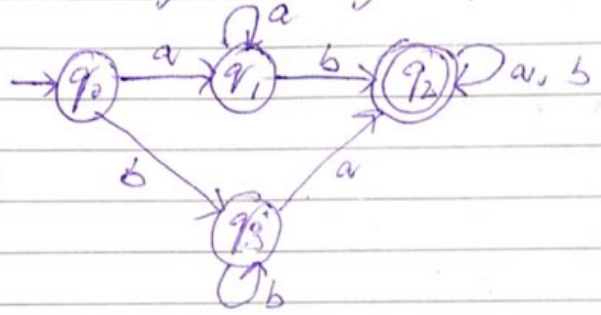
L_9 = string containing no more than 3a's

$r = b^* \cdot (a+\lambda) \cdot b^* \cdot (a+\lambda) \cdot b^* \cdot (a+\lambda) \cdot b^*$



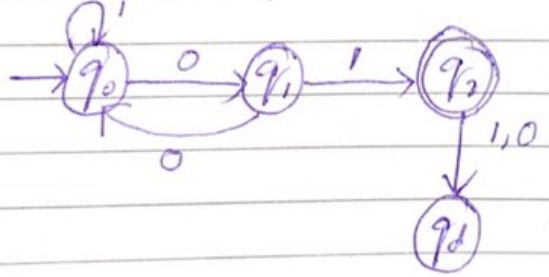
L_{10} = all strings that contain atleast one occurence of each symbol in alphabet

$r = (a+b)^* a (a+b)^* b (a+b)^*$



L_{11} = all strings ending in 0, 1

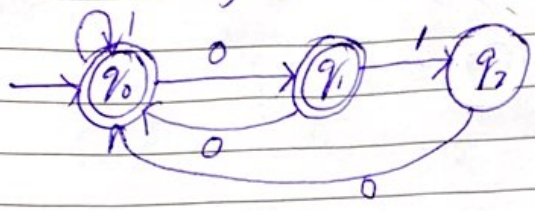
$r = (0+1)^* 01$



Date: _____

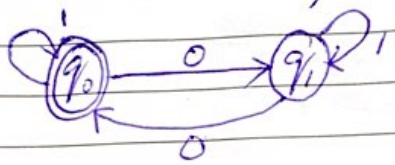
L_{12} = all strings not ending in 0, 1

$r = (0+1)^*(00+10+11)$



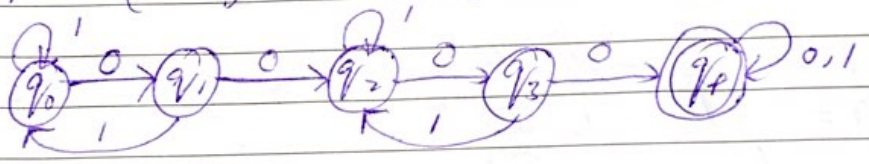
L_{13} = All string containing even numbers of zeros.

$r = 1^* + (1^*01^*0)^*1^*$



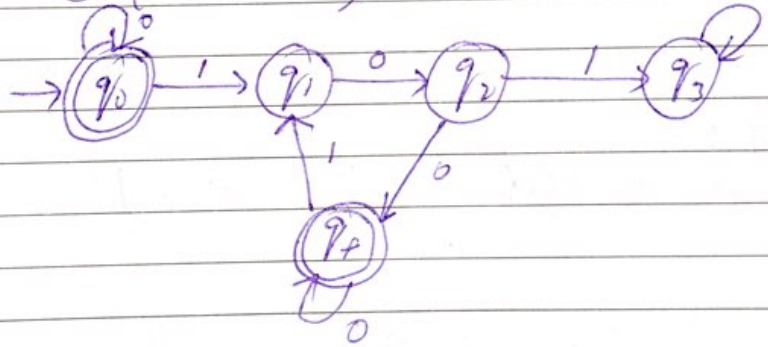
L_{14} = all string having atleast two occurrence of substring 00

$r = (1+0)^*00(1+0)^*00(1+0)^*$



L_{15} = all strings not containing 101

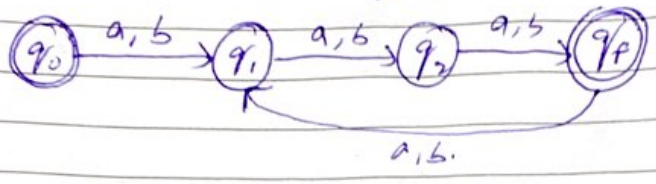
$0^*(1^*000^*)^*1^*0^*$



Date: _____

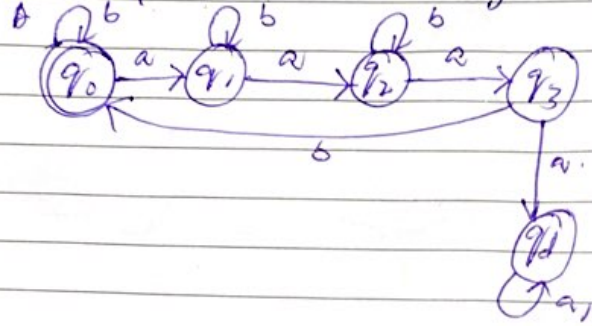
$L_{16} = \{w : |w| \bmod 3 = 0\}$

$r = ((a+b)(a+b)(a+b))^*$



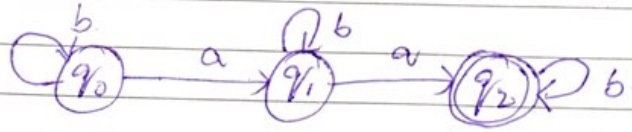
$L_{17} = \{w : n_a(w) \bmod 3 = 0\}$

$r = (b^* a b^* a b^* a b^*)^* + b^*$



L_{18} = Language of all strings containing exactly two a's

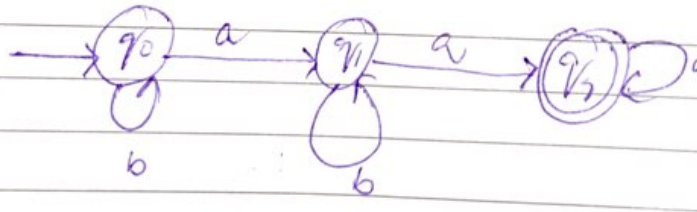
$r = b^* a b^* a b^*$



L_{19} = Language of all strings containing atleast two a's

~~$r = ((b^* a b^* a b^*)^*)^*$~~

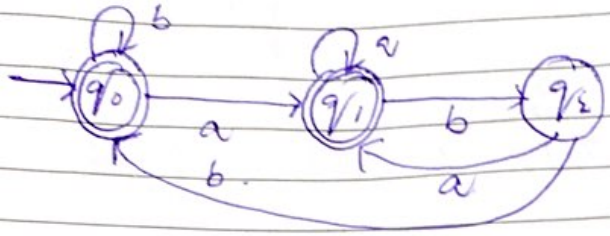
$r = (a+b)^* (a+b)^* a (a+b)^*$



Date: _____

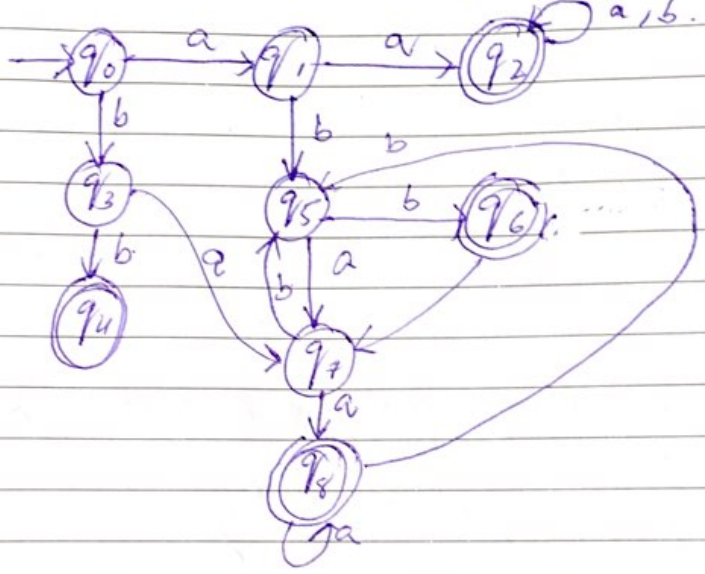
L_{20} = Language of all strings donot end with ab.

$r = (a+b)^*(aa+bb+bb)+a+b+\lambda$



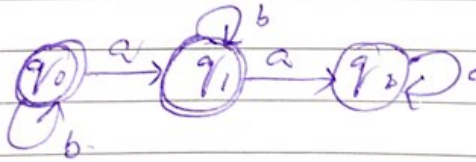
L_{21} = Language of all strings that begin or end with aa or bb

$r = (aa+bb)(a+b)^* + (a+b)^*(aa+bb)$



L_{22} = Language of all strings not containing aa

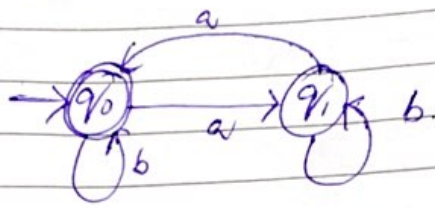
$r = a+b^*+b^*ab^*$



Date: _____

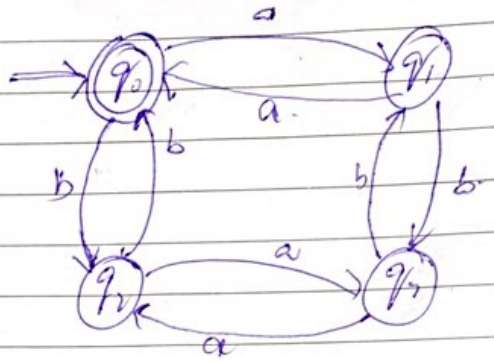
L_{23} = Language of all strings in which numbers of a's is even

$r = (b + ab^*ab^*)^*$



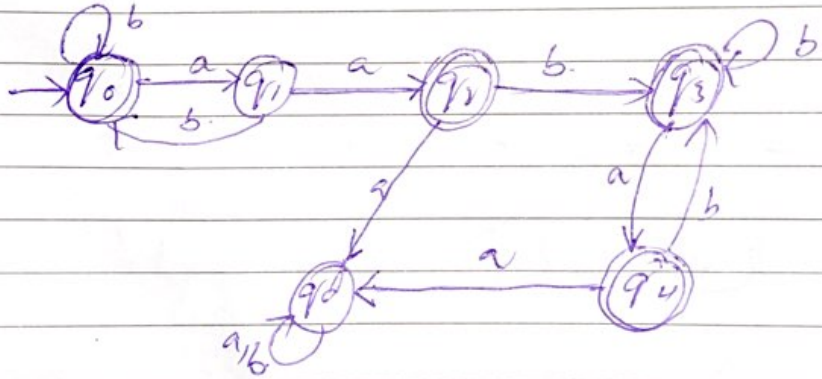
L_{24} = Language in which both number of a's & number of b's are even.

$(aa + bb + (ab + ba)(aa + bb)^*(ab + ba)^*)^*$



L_{25} = Language of all strings containing no more than one occurrence of string aa

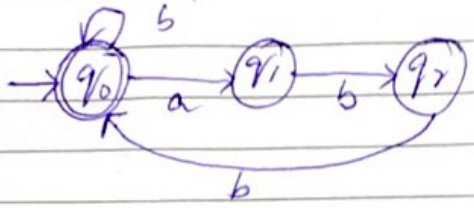
$(b^* + (ab)^*)(aa)(b^* + (ba)^*)$



Date: _____

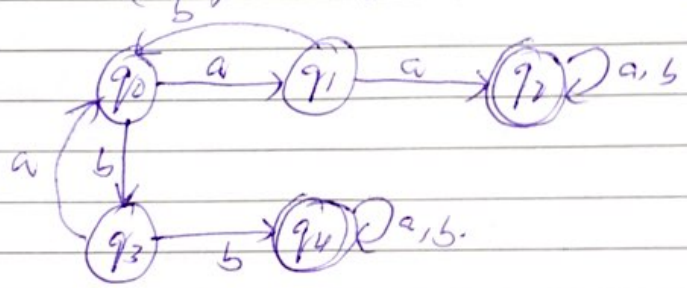
L_{26} = Language in which every a is followed by bb.

$$r = (b + abb)^*$$



L_{27} = Language of strings containing both bb and aa as substring.

$$r = [(a+b)^* aa (a+b)^* bb (a+b)^* + (a+b)^* bb (a+b)^* aa (a+b)^*]$$



L_{28} = Language containing both aba & bab

$$r = (a+b)^* aba (a+b)^* bab (a+b)^* + (a+b)^* bab (a+b)^* aba$$