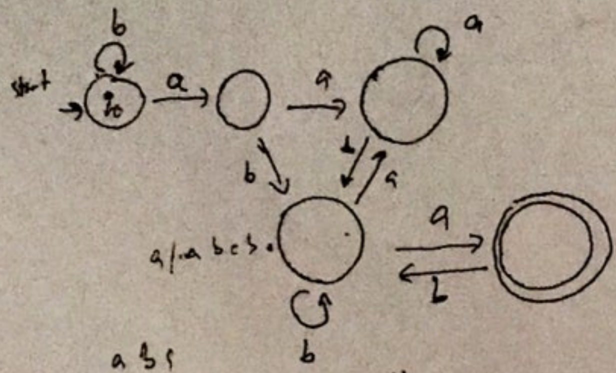
1(a) $a(a+b)^*ba$

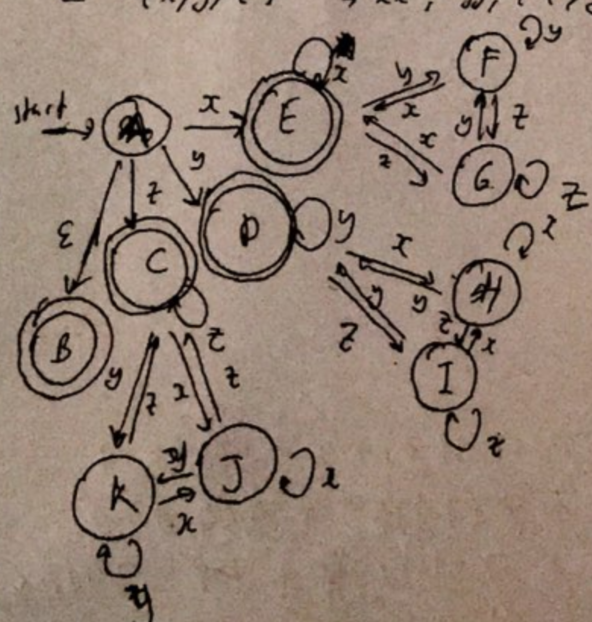


abs

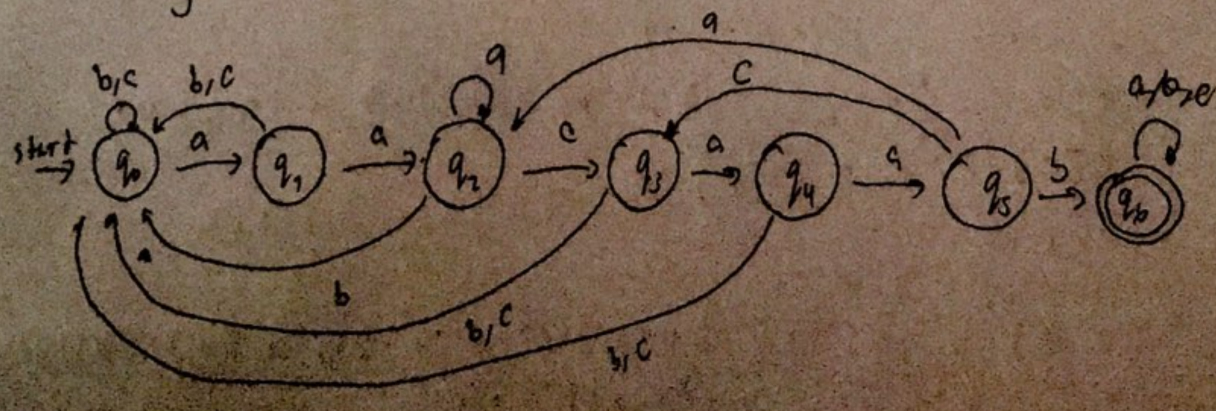
ababab a   abbbs

aaaas

1(d) $\Sigma = \{x, y, z\}$ → xx, yy, zz, ε



1(c)

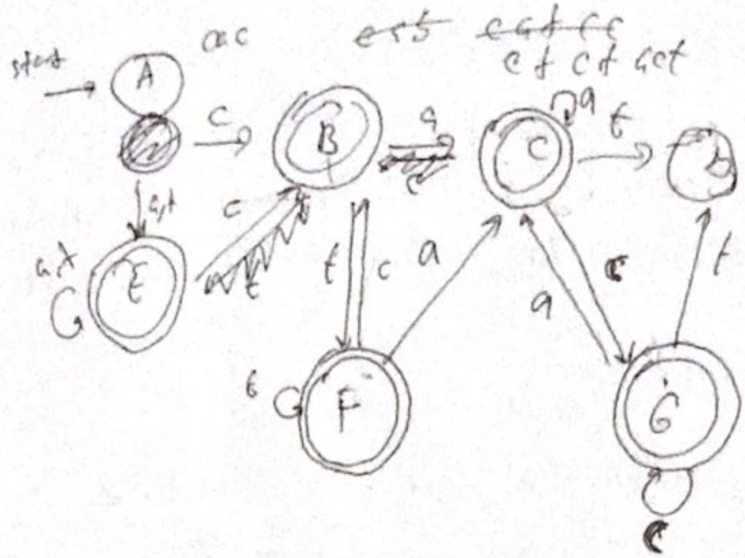


a/b/c

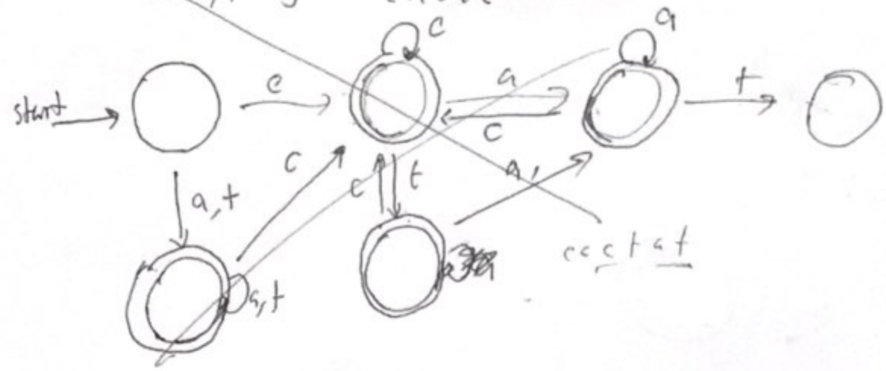
aaca, b/c   aacaa

aacaa

(b)



(b) $\Sigma = \{a,t,c\}$



4 $h(x) = (x[0]\cdot b^{n-1} + x[1]\cdot b^{n-2} + \dots + x[n-1]\cdot b^{0}) \% q$

let $b = 256$, $q = 7513199$

$h(x) = 6081213$

$\text{len}(x) = 28$

ascii $t = 116$

$o = 111$

$c = 99$

add t $(6081213 \times 256 + 116) \% 7513199 = 1558451$

add o $(1558451 \times 256 + 111) \% 7513199 = 764020$

add c $(764020 \times 256 + 99) \% 7513199 = \cancel{2?}\ 246045$

when add t, $\text{len}(x) = 29$

$(x[0]\cdot b^{28} + \boxed{}) \% 7513199 = 1558451$

$(x[0]\cdot b^{29} + \boxed{}) \% 7513199 = 6081213$

$a \bmod b = a -$

$(x[0]\cdot b^{28} + \boxed{} + 116 \times 256^2 + 111 \times 256 + 99) \% 7513199$

$(x[0]\cdot b^{28} + \boxed{}) \% 7513199$

$(X \times 256^{28} + \boxed{}) \% 7513199 = 6081213$

$X \times 256^{28} + \boxed{} - \boxed{} = 6081213 - \boxed{}$

~~X×2~~

$(x \cdot 256^{28} + \boxed{} + 116 \times 256^{2} + 111 \times 256^{1} + 59) \% 7513199 -$

$(x \cdot 256^{28} + \boxed{}) \% 7513199 = 246045 - 6081213$

$= 246045 - ,$

$= -5835168$

$x \cdot 256^{28} + \boxed{} + 1 = 246045$ ↓ get x

$246045 - \boxed{} \times 256^{2} = \Delta$

$\boxed{} \times 256^{2} = 246045 - \Delta$

↙

$\boxed{} = x$

$\cancel{x \cdot 256^{28} + 7 + 116 \times 256^{2}}$

$x \cdot 256^{2} =$

$246045 - x \times 256^{2} = \text{ans}.$

~~there exist a DFA M = $(Q, \Sigma, \delta_0, q_0, F)$~~

AFSOC, there exist a DFA $M = (Q, \Sigma, \delta_0, q_0, F)$ that ~~need~~ have less than 101 states that recognise L. ~~L~~ let M have 100 states. ~~Then there will be According to the~~ ~~pigeon hole principle~~

$r_i = \delta^*(q_0, a^i)$ for $i = 0, 1, \ldots, 100$

~~By pigeon hole principle, there must be at least.~~ 2

We know that the modulo of 101 gives value from 0 to 100. which ~~require~~ is 101 posibilities. This mean let 101 posibilities be pigeon and our our 100 states be hole. Then according to pigeon hole principle there will be 2 value in the same state. ~~r_i cannot be equal to~~ r_j so let $r_i = r_j$. However, r_i cannot be equal to r_j because ~~DFA cannot~~ a state cannot be both accepting and not accepting. Therefore, ~~this~~ contradiction. Hence you need at least 101 state.