Set - 2

1. 20pts. Use Proper English to describe the following regular language

i $aa(a|b|c)^*(bb|cc)(a|b|c)^*$

The set of strings over $\{a,b,c\}$ that contains all the strings starting with substring 'aa' and contain either substring bb (or) cc (or) both.

ii $(a|b)^*(c(a|b)^*c(a|b)^*)^*c(a|b)^*ccc$

The set of strings over $\{a,b,c\}$ which contains even number of c's ending with 'ccc' (with zero (or) any number of a's & b's)

30pts 2. Assume $\Sigma=\{a,b,c\}$ write regular expression for the following

30pts

i All string over $\{a,b,c\}$ that contains no aa's

$b^* | b^*(ab^+)ab^*$

ii All string of digits such that all the 2's & 3's occur after all the 8's & 9's

$(1|4|5|6|7|8|9)^*(1|2|3|4|5|6|7)^*$

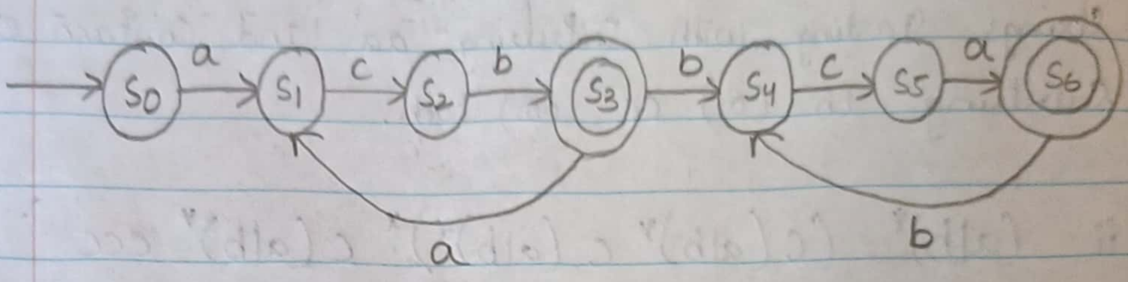
iii All strings over $\{a,b,c\}$ in which the number of b's Plus the number of c's is 4.

$a^*(b|c)a^*(b|c)a^*(b|c)a^*(b|c)a^*$

3pts

3. Construct DFA without ε-transition for the following regular language

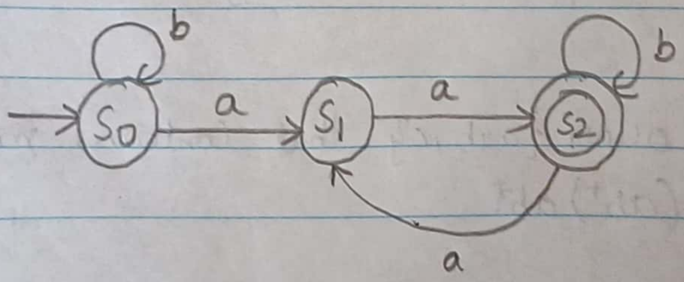
i $(acb)^+ (bca)^*$



where Initial states - $\{S_0\}$

final states - $\{S_3, S_6\}$

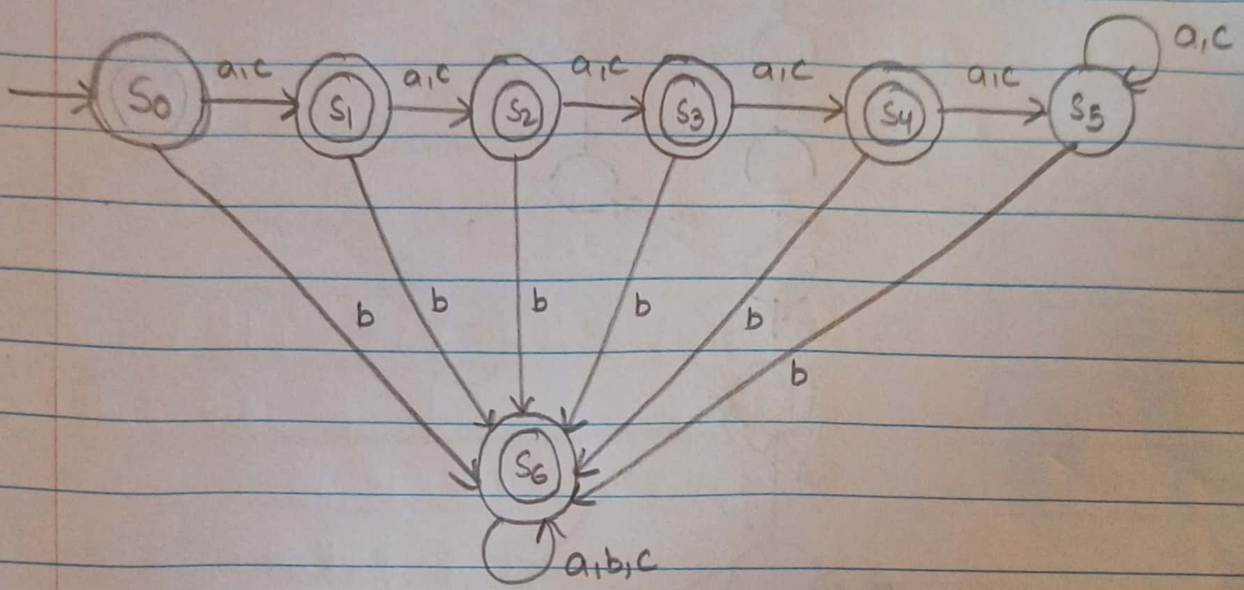
ii The set of strings over $\{a, b\}$ in which the number of a's is even and at least 2



Initial State - $\{S_0\}$

final State - $\{S_2\}$

iii The set of strings over $\{a,b,c\}$ which contain at least one b if its length is greatherthan (>) 4



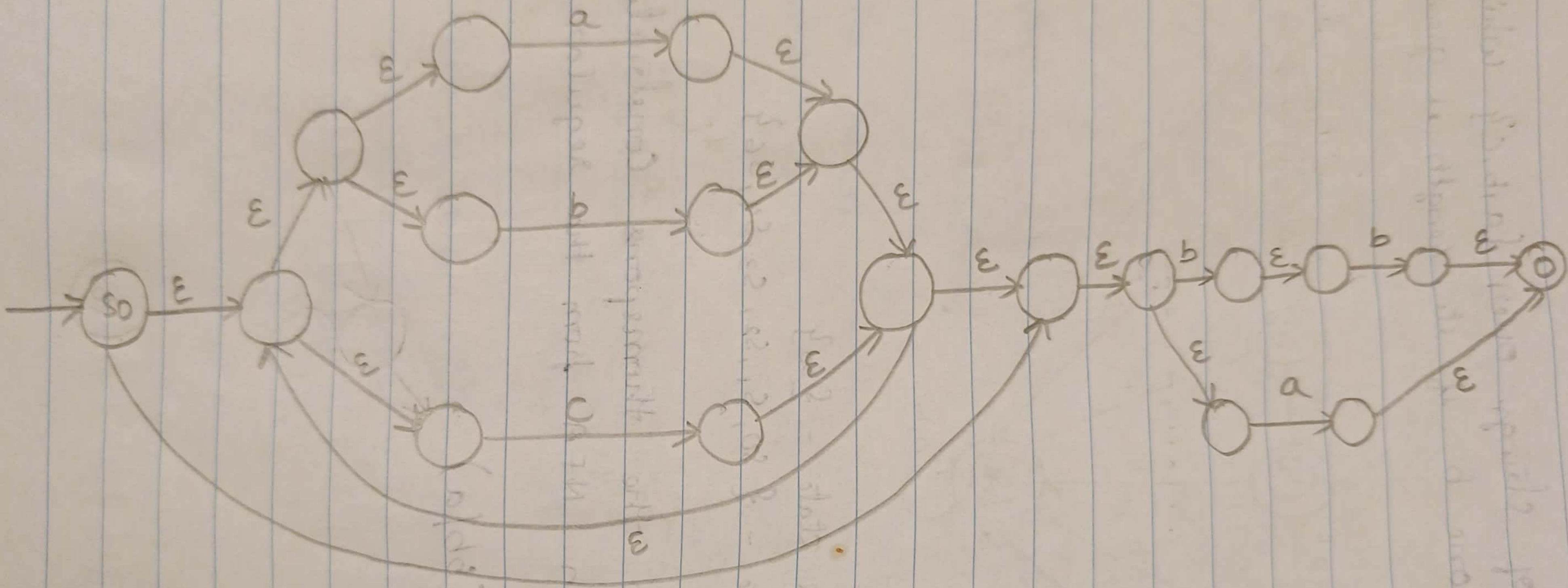
Where Initial state - $\{S_0\}$

final state - $\{S_0, S_1, S_2, S_3, S_4, S_6\}$

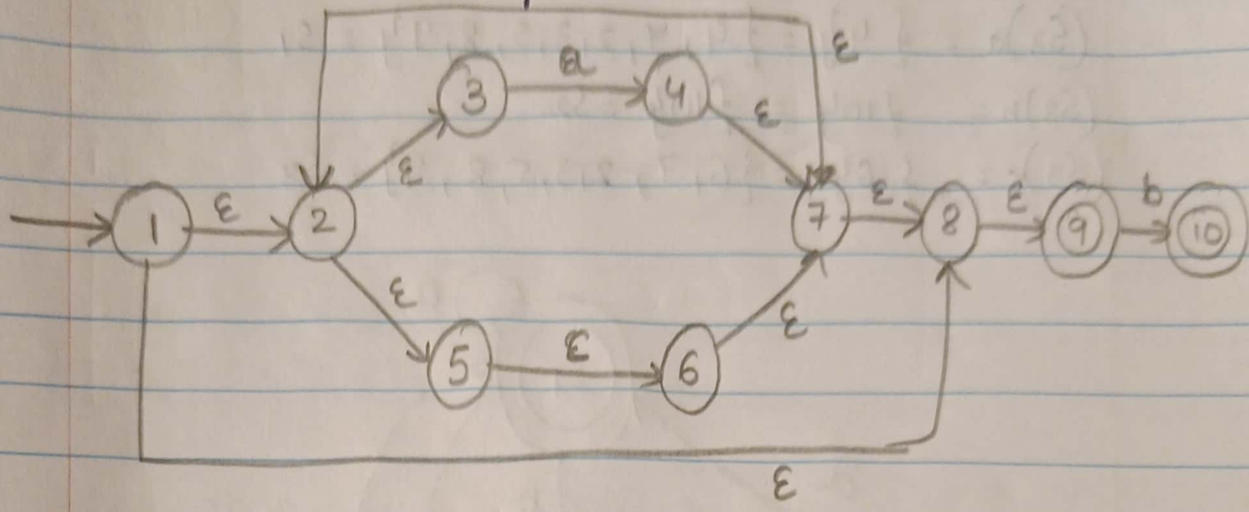
4. According to the thomspons Construction, Construct an NFA from the regular expression
· 10pts

$(a|b|c)^* (bb|a)$

$(a|b|c)^{*}\ (bb|a)$



Q5. Convert the following NFA into a DFA without ε-transition using the Subset Construction (ε closure) draw the resulting DFA



$S_0 = \{1,2,3,5,8,9\}$

from S_0 : $S_0 = \{1,2,3,5,8,9\}$

$(S_0)a = \{4\} = \{4,7,8,9,2,3,5\} = S_1$

$(S_0)b = \{10\} = \{10\} = S_2$

$(S_0)c = \{6\} = \{6,7,8,9,2,3,5\} = S_3$

from S_1 : $S_1 = \{4,7,8,9,2,3,5\}$

$(S_1)a = \{4\} = \{4,7,2,3,5,8,9\} = S_1$

$(S_1)b = \{10\} = \{10\} = S_2$

$(S_1)c = \{6\} = \{6,7,2,3,5,8,9\} = S_3$

from S_2 - $S_2 = \{10\}$

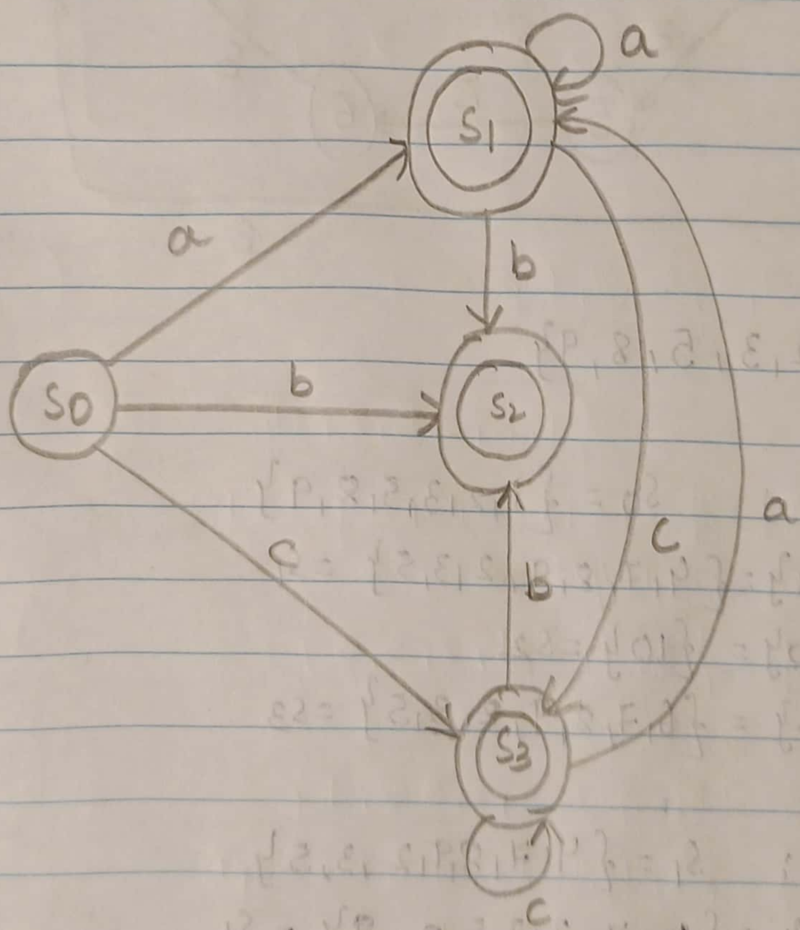
$(S_2)a = \{4\} = X$

$(S_2)b = \{10\} = X$

$(S_2)c = \{6\} = X$

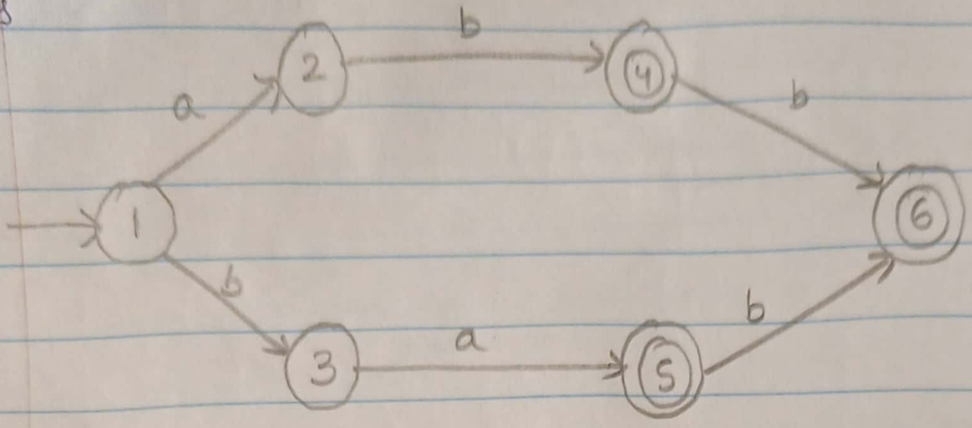
From S_3 : $S_3 = \{6, 7, 8, 9, 2, 3, 5\}$

$(S_3)a = \{4\} = \{4, 7, 2, 3, 5, 8, 9\} = S_1$
$(S_3)b = \{10\} = \{10\} = S_2$
$(S_3)c = \{6\} = \{6, 7, 2, 3, 5, 8, 9\} = S_3$



(6) Apply the State Minimization algorithm of Section 2.4.4 to the following DFA. draw the resulting DFA

5. 10pts



$S_0 = \{1, 2, 3\}$

$S_1 = \{4, 5, 6\}$

$S_0 = T(1, a) = 2 \qquad T(1, b) = 3$

$S_1 = T(2, a) = x \qquad T(2, b) = 4$

$S_2 = T(3, a) = 5 \qquad T(3, b) = x$

$S_3 = T(4, a) = x \qquad T(4, b) = 6$

$S_4 = T(5, a) = x \qquad T(5, b) = 6 \quad \Big\} \quad S_3 = \{4, 5\}$

$S_5 = T(6, a) = x \qquad T(6, b) = x$

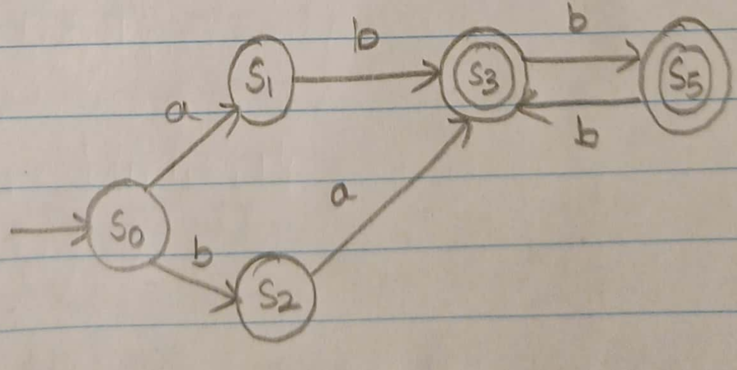
$S_0 = \{1\}$

$S_1 = \{2\}$

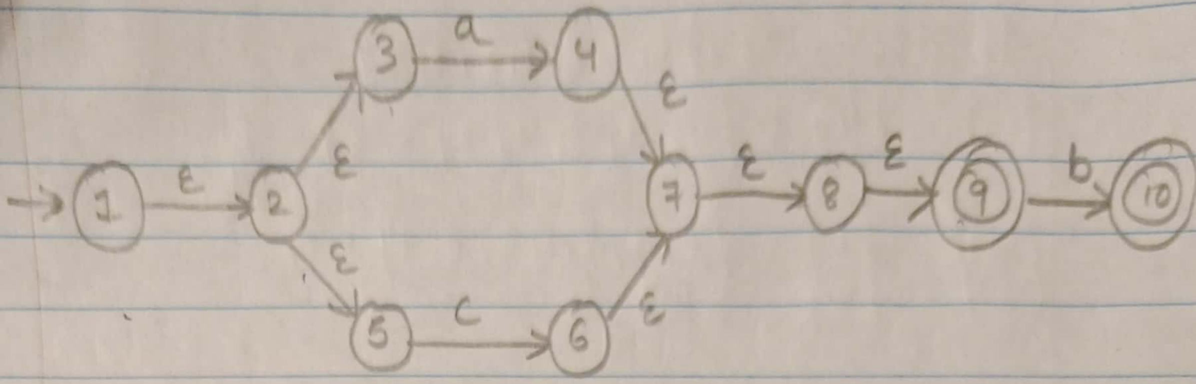
$S_2 = \{3\}$

$S_3 = \{4, 5\}$

$S_5 = \{6\}$



5.



$S_0 = \{1, 2, 3, 5\}$

from S_0 : $S_0 = \{1, 2, 3, 5\}$

$(S_0)a = \{4\} = \{4, 7, 8, 9\} = S_1$

$(S_0)b = \{10\} = X$

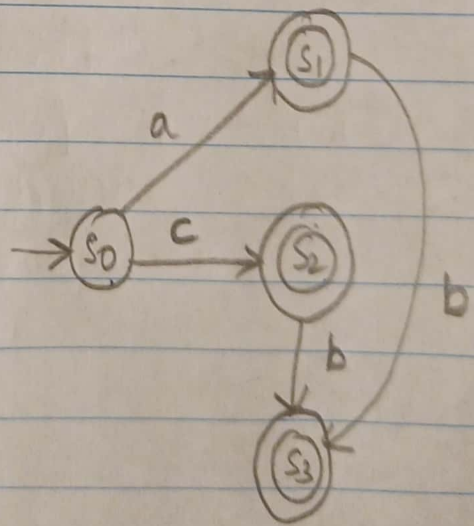
$(S_0)c = \{6\} = \{6, 7, 8, 9\} = S_2$

from S_1 : $S_1 = \{4, 7, 8, 9\}$

$(S_1)a = \{4\} = X$

$(S_1)b = \{10\} = \{10\} = S_3$

$(S_1)c = \{6\} = X$



from S_2 : $S_2 = \{6, 7, 8, 9\}$

$(S_2)a = \{4\} = \{X)$

$(S_2)b = \{10\} = \{10\} = S_3$

$(S_2)c = \{6\} = X$

from S_3 : $S_3 = \{10\}$

$(S_3)a = X$

$(S_3)b = \{10\} = X$

$(S_3)c = X$