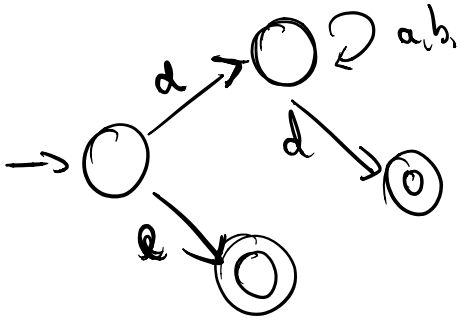
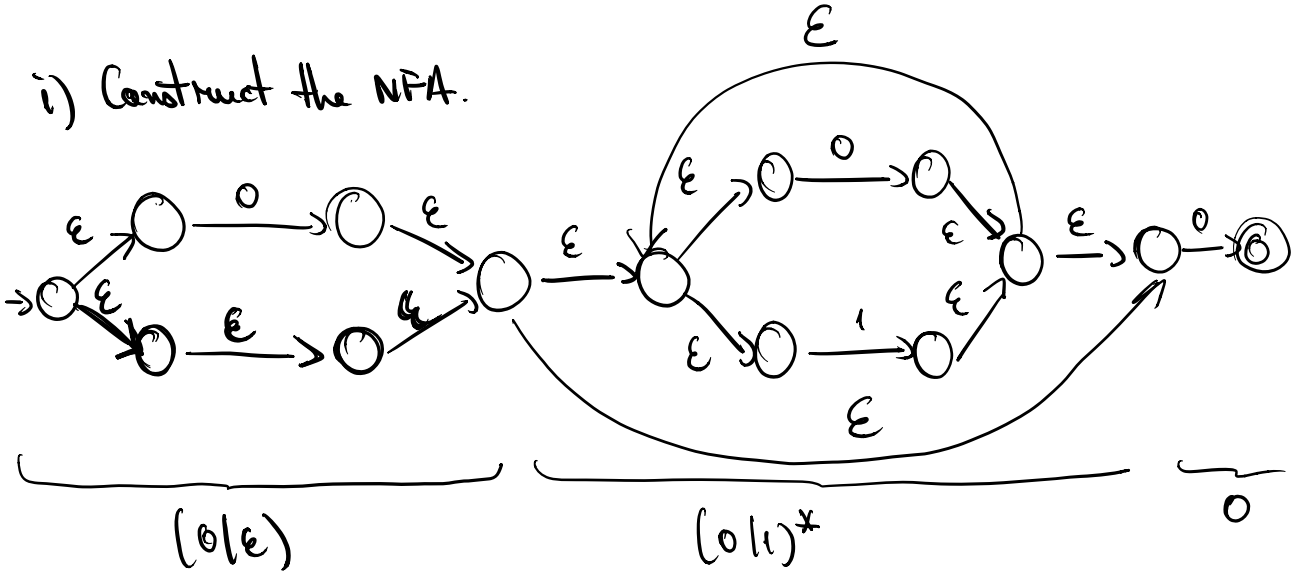
a)



ε|(d(a|b|c)*d)

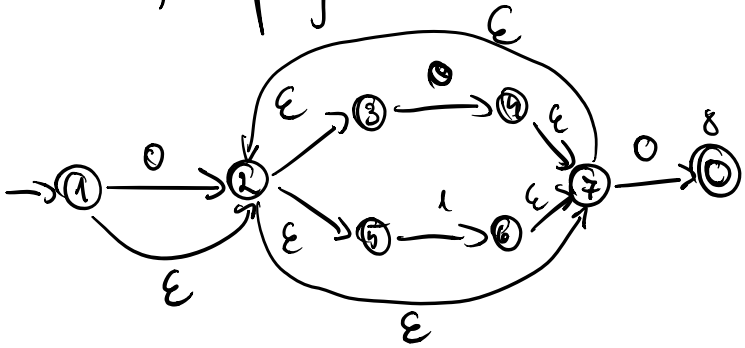
b) $(0|\varepsilon)(0|1)^*0$

i) Construct the NFA.

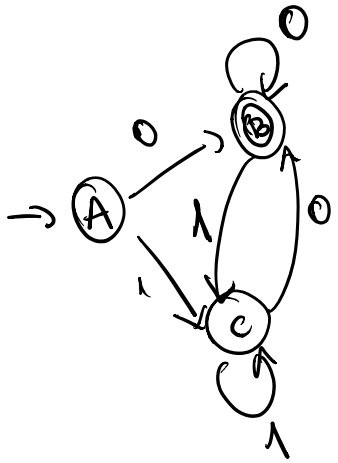


ii) Convert to DFA.

First, simplify the NFA.



Step	Current state	Next State (0)	Next State (1)
0	{1,2,3,5,7} (A)	{2,3,4,5,7,8} (B)	{2,3,5,6,7} (C)
1	{2,3,4,5,7,8} (B)	{2,3,4,5,7,8} (B)	{2,3,5,6,7} (C)
2	{2,3,5,6,7} (C)	{2,3,4,5,7,8} (B)	{2,3,5,6,7} (C)

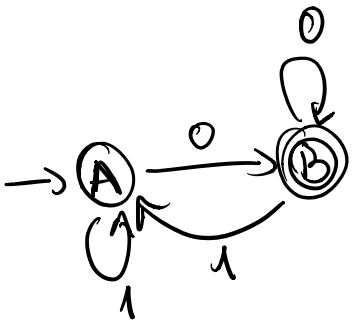


iii) Optimise the DFA

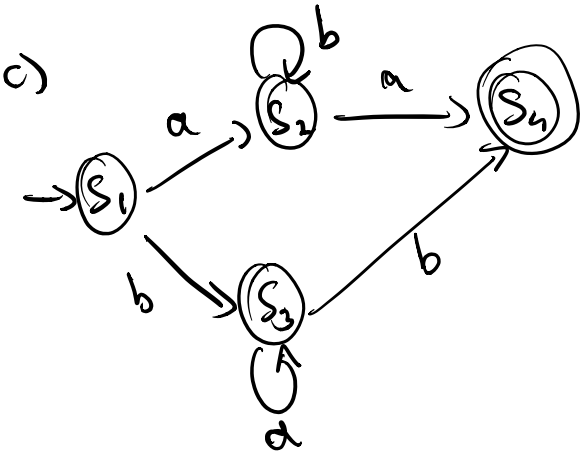
Step	Partition
0	{A,C}, {B}

	0	1
A	B	C
C	B	C

=> Can't distinguish between A and C.



c)



d) $(799) \mid \underbrace{((819) \mid \text{digit digit})}_{800-999.} \mid \underbrace{((1\text{-}9)\ \text{digit digit digit}\ (\text{digit})^*)}_{\geq 1000}$