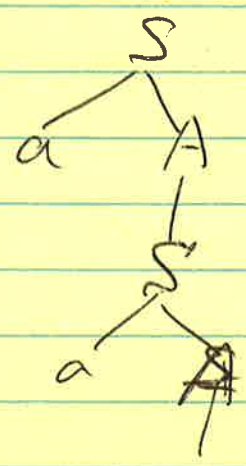
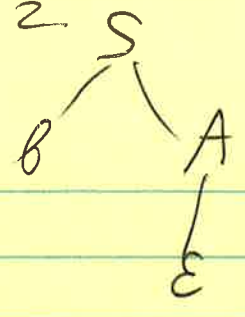
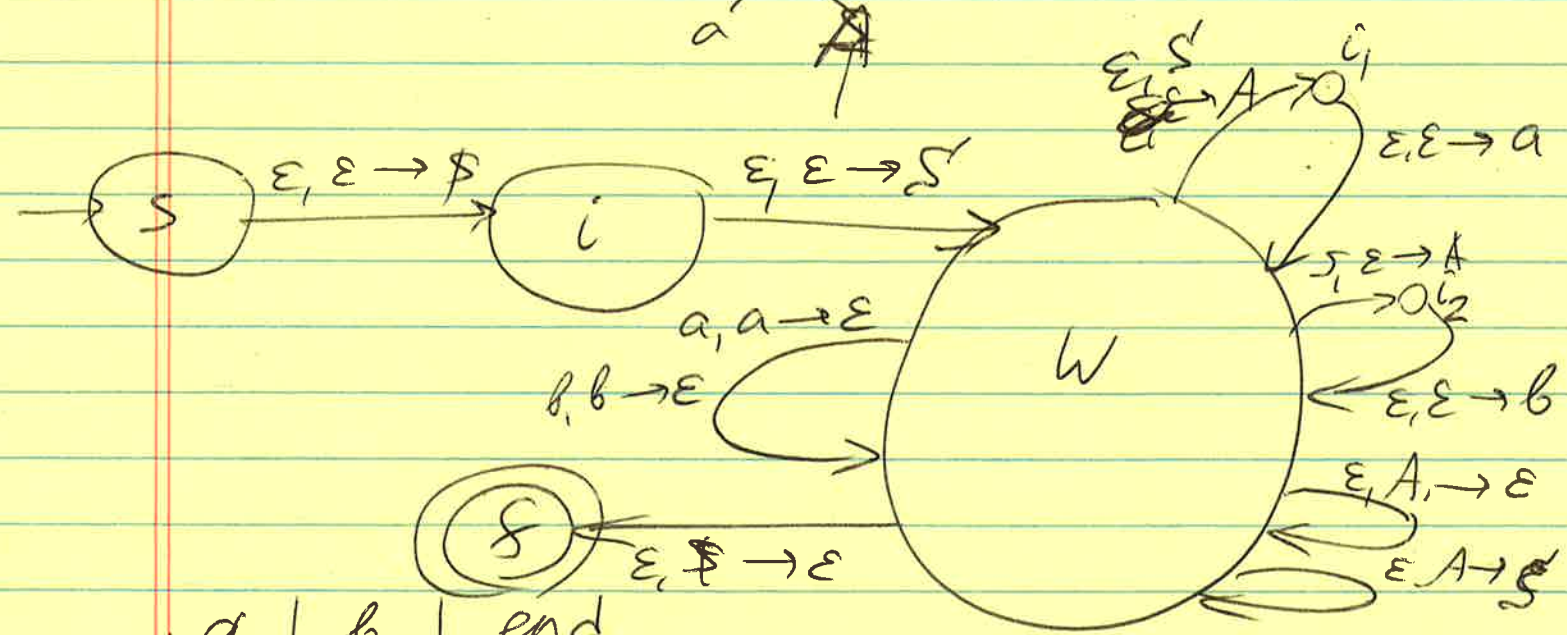


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- 1-)
1. $S \rightarrow aA$
 2. $S \rightarrow bA$
 3. $A \rightarrow S$
 4. $A \rightarrow \epsilon$

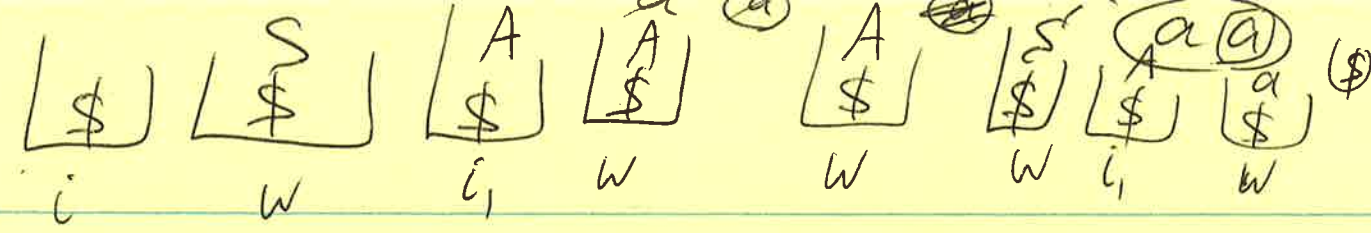


(a)

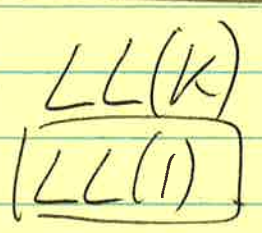


	a	b	end
S	1	2	
A	3	3	4

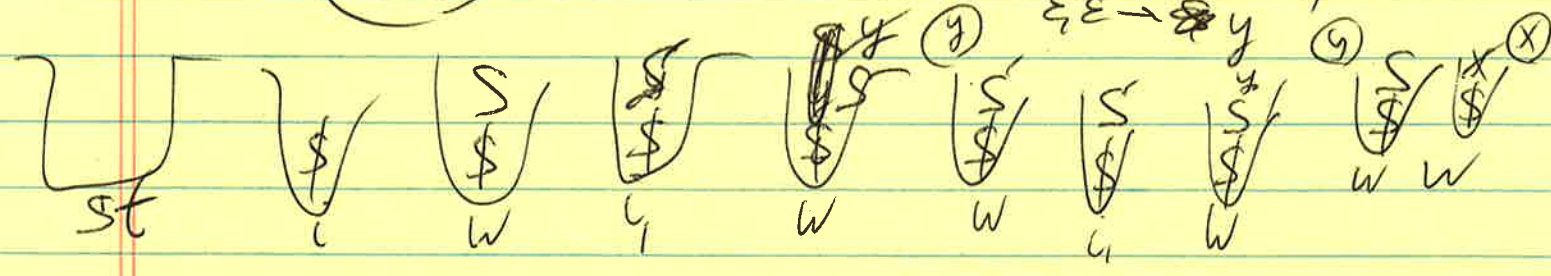
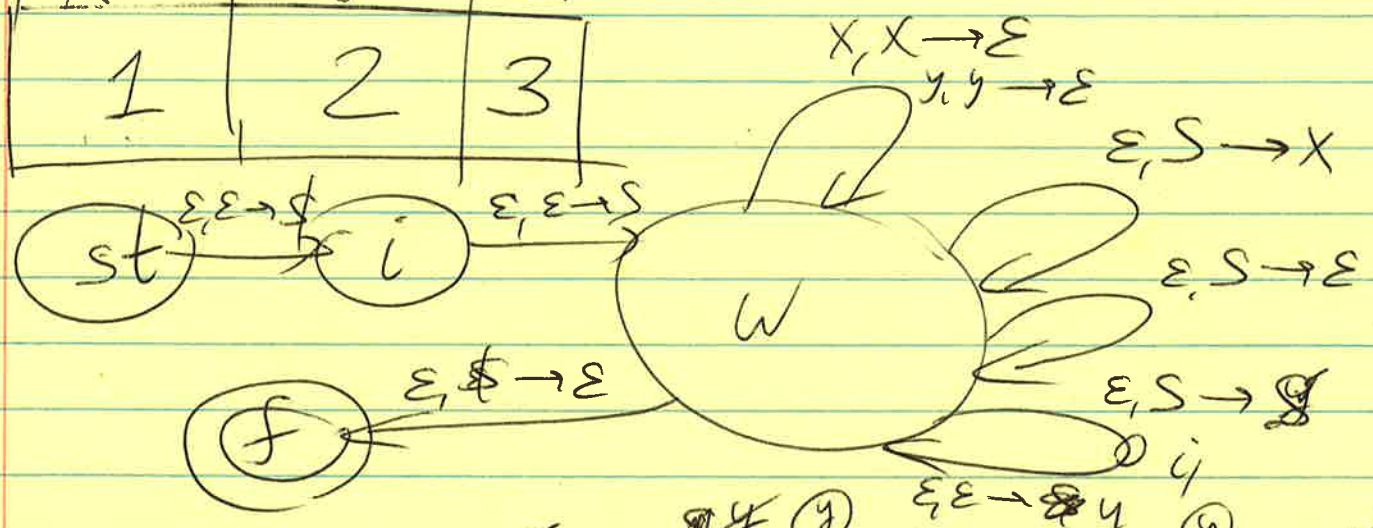
11112118
-2-



1. $S \rightarrow X$
2. $S \rightarrow yS$
3. $S \rightarrow \epsilon$



	X	y	end
S	1	2	3



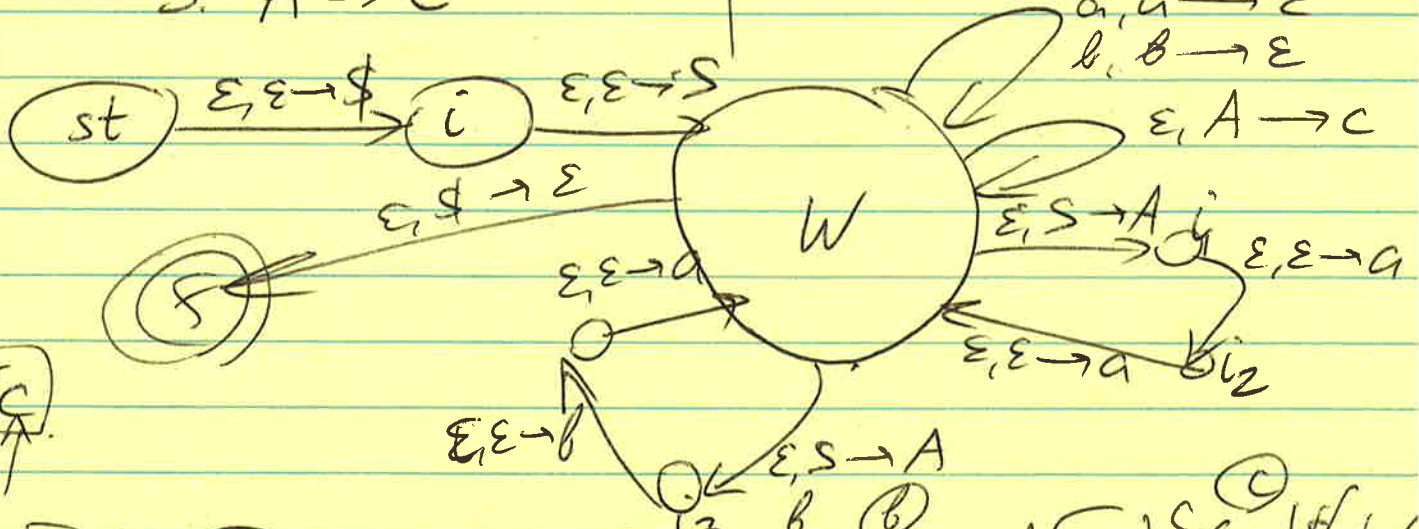
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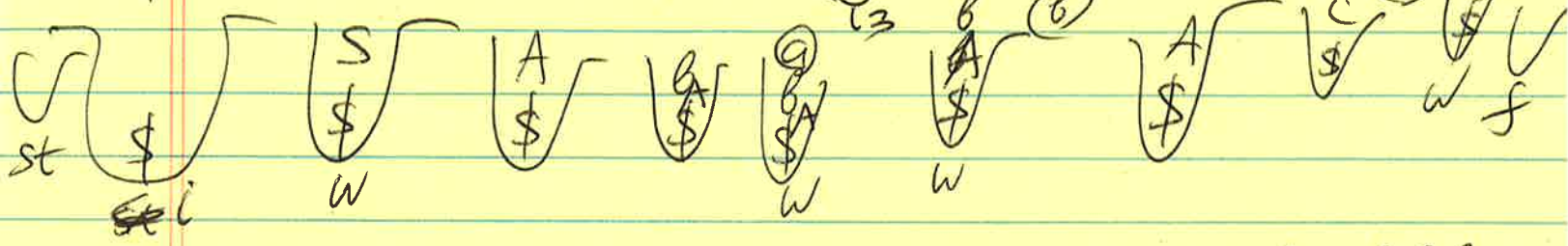
1. $S \rightarrow aaA$
2. $S \rightarrow abA$
3. $A \rightarrow c$

	aa	ab	c	anyth else
S	1	2	—	—
A	—	—	3	—

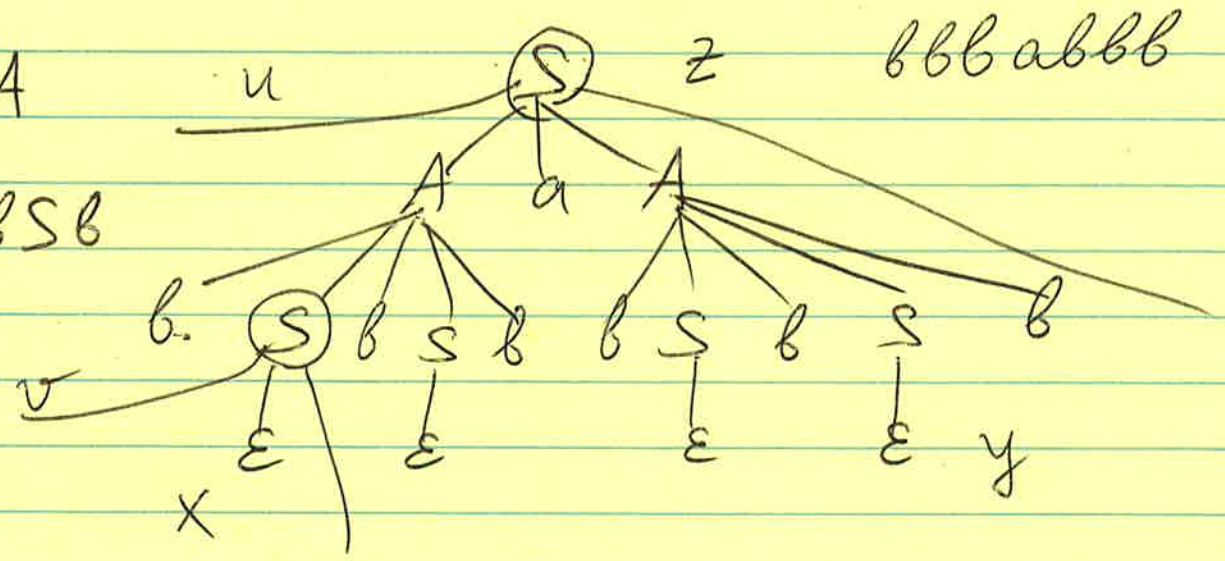
$c, c \rightarrow \epsilon$
 $a, a \rightarrow \epsilon$
 $b, b \rightarrow \epsilon$
 $\epsilon, A \rightarrow c$



abc
↑↑↑



- $S \rightarrow AaA$
- $S \rightarrow \epsilon$
- $A \rightarrow bSbSb$

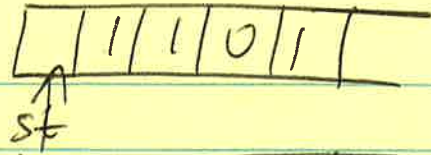


- (u = ϵ)
- (v = b)
- (x = ϵ)
- (y = bbbabbb)
- (z = ϵ)

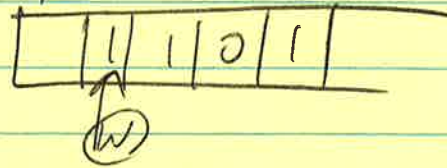


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-4-

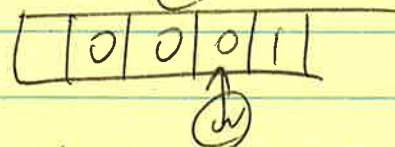
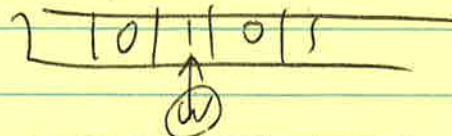
8 + operation
1011 (11)



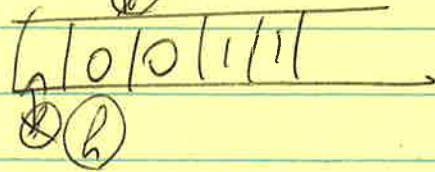
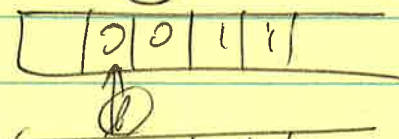
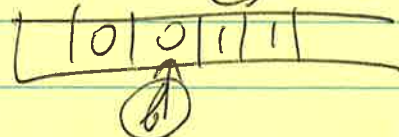
1
1100 (12)



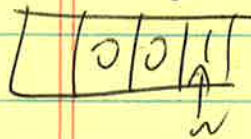
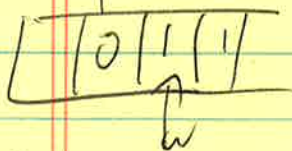
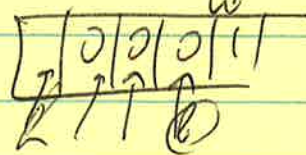
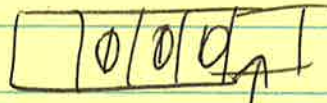
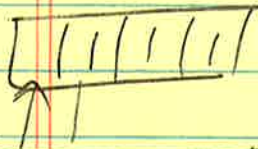
start, L → working, R
working, 1 → 0, R
working, 0 → 1, back, L
back, 0 → L
back, 1 → halt



1100



$$7_{10} = 111_2$$



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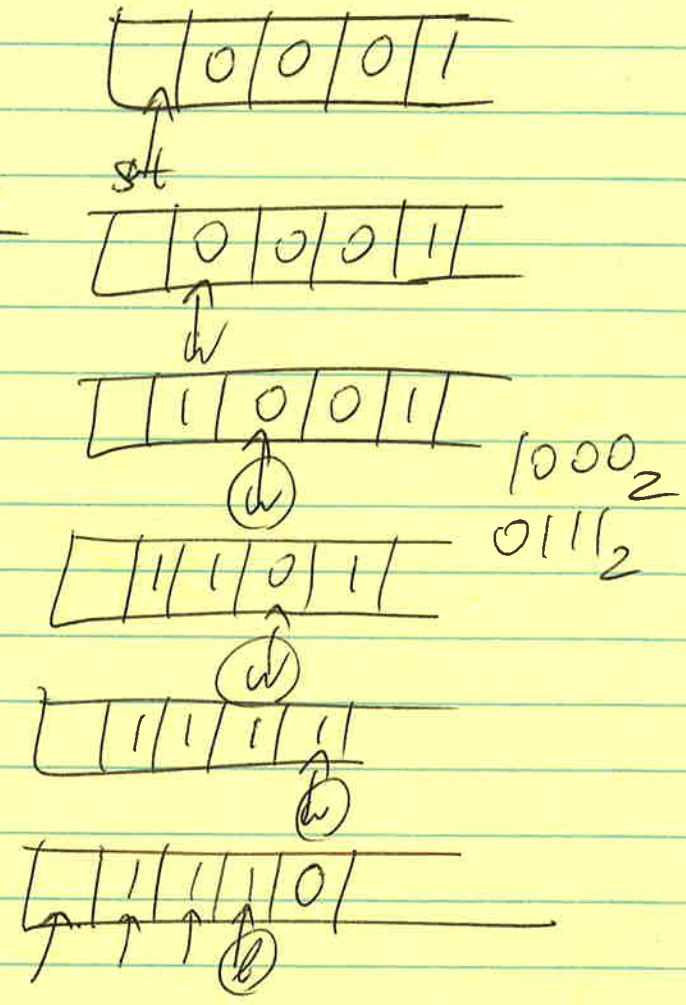
-- operation

1000
 1

0111

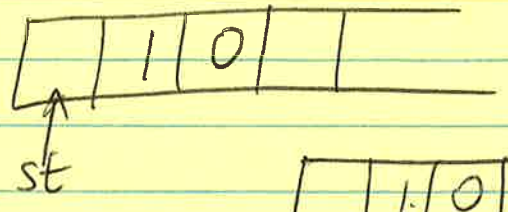
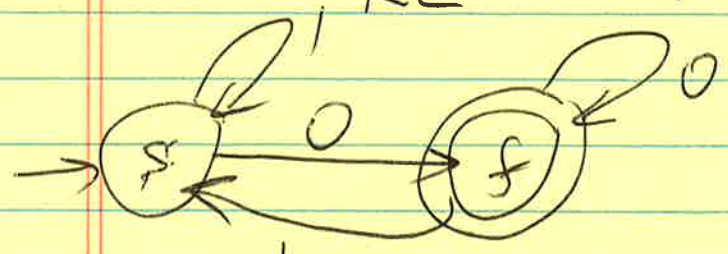
0 → replace w/ 0
1 → replace w/ 0 & back

{ start, \sqcup → working, R
 working, 0 → 1, R
 working, 1 → 0, back, L
 back, 1 → L
 back, \sqcup → halt



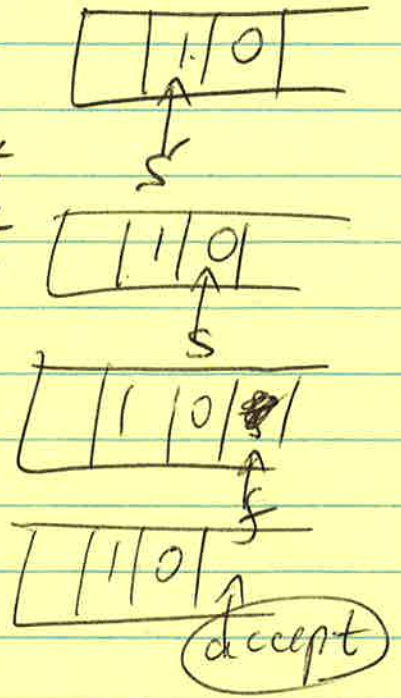
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FA → PDA → TM
RL CFG



- s, \sqcup → s, R
- s, 0 → f, R
- s, 1 → s, R
- f, 0 → f, R
- f, 1 → s, R

s, \sqcup → reject
f, \sqcup → accept



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-7-

$N=5$ $q_0 = \text{start}$, $q_1 = S$, $q_2 = F$
 $q_3 = \text{accept}$, $q_4 = \text{reject}$

$S_0 = \cup$, $S_1 = 1$, $S_2 = 0$

state $[n][m]$ what is new state if in state q_n and sees S_m .

state $[0][0] = 1$ if we are in state $q_0 \equiv \text{start}$
and we see symbol $S_0 \equiv \cup$
we move to state $q_1 \equiv S$

state $[1][2] = 2$

state $[1][1] = 1$

lr $[0][0] = 'R'$

lr