Math 322

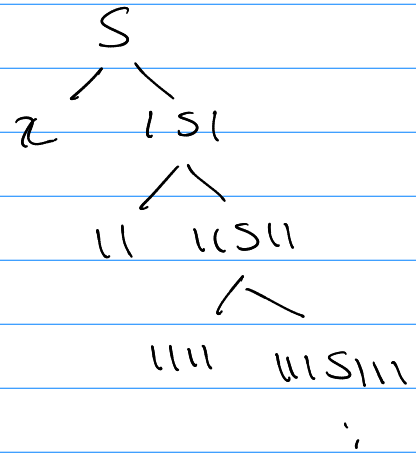
Exam 4 11 probs @ 10pts 100pts = 100%

13.1 Grammar's (2 probs)

① given productions of a grammar.
Find $L(G)$

$V = \{1, S\}$ $T = \{1\}$

$P = \{ S \to \lambda$
$S \to 1S1 \}$



$L(G) = \{\lambda, 11, 1111, 111111, \dots\}$
$= \{11\}^*$

② given productions ... grammar type?

ans: type 0 not 1
type 1 not 2 (+) why?
type 2 not 3
type 3

ex $P = \{ aA \to Aa,\ S \to aAS,\ S \to \lambda,\ A \to a \}$

$aA \to Aa$: type 0? not 2
$S \to aAS$: not 3
$S \to \lambda$: ok type 2
$A \to a$: ok type 3

type 1 not 2

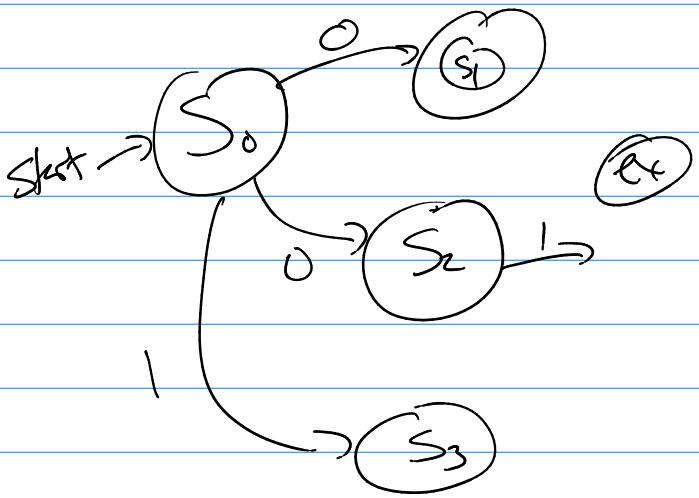
13.2 Machines with output. (2 probs)

Make a machine → State diagram? / State table? } be able to do both.

2 of 3 possible
1. Vending
2. binary adder
3. delay machine

13.3 F.S.A

1. L(M) M is det or non-det
2.
3. given a non-det M → create a det M (not in the creative way)

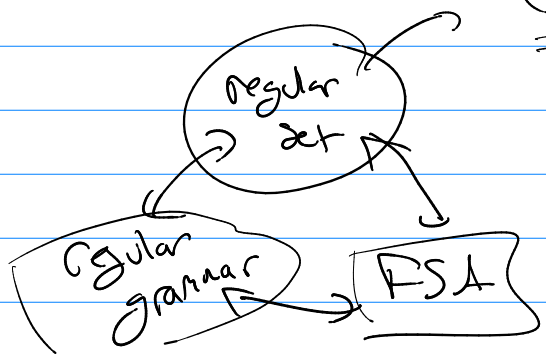


13.4 Language recognition.

1. regular set
   → make FSA

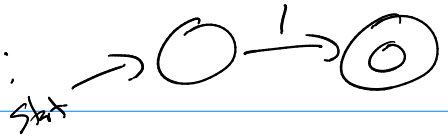
(not in the creative way)

(2) $(01)^* 11 (01)$

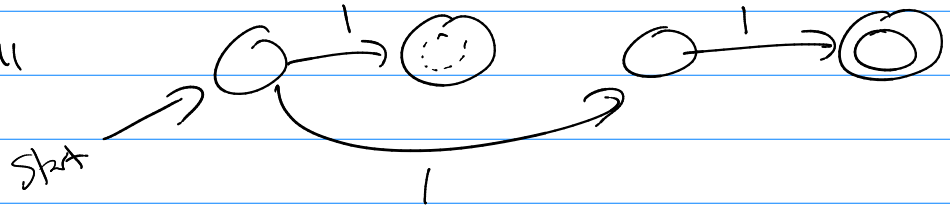


$L(M) = 111$

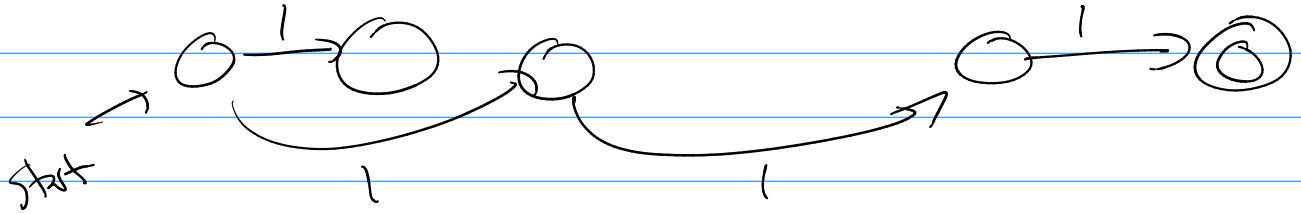
M_1 :



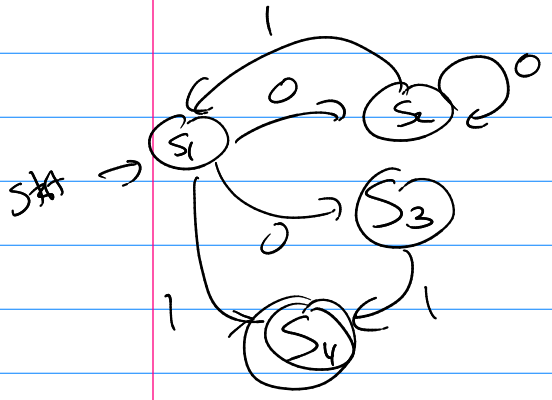
M_{11}

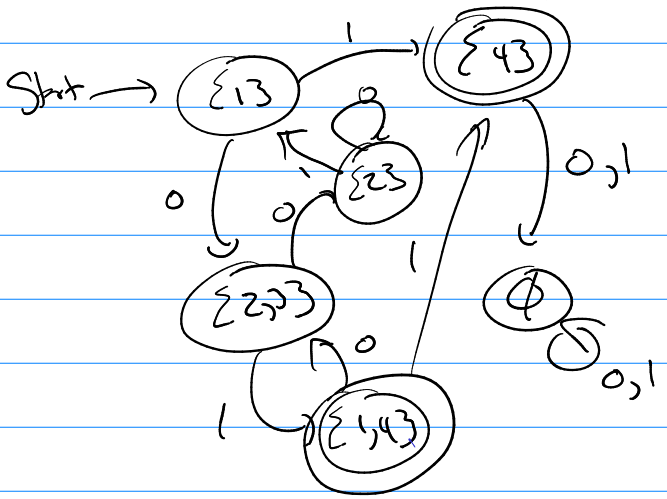


M_{111}



Back to 3.7





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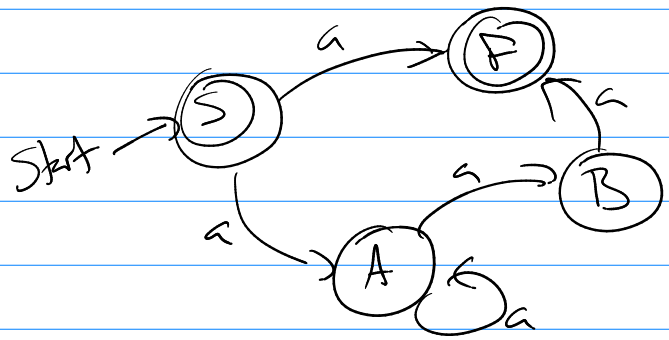
back to 3.4

(2) productions → make FSA

$P = \{ S \to \lambda$
$S \to aA$
$S \to a$
$A \to aA$
$A \to aB$
$B \to a \}$



13.5 Turing Machines

① Run T

② Make a math theatre T.

$f(n) = n-3$ → only for $n \geq 3$

Numbers.

0 = 1
1 = 11
2 = 111
3 = 1111
⋮

$f(4) = 4-3 = 1$

Ways: $f(1111) = 1$ (3 → 0)

$f(111111) = 11$

$f(1111111) = 111$ (4 → 1)

$n-3$ is really make 3 tallys blank.

$\delta = \{(S_0, 1, S_1, B, R)$
$(S_1, 1, S_2, B, R)$
$(S_2, 1, S_F, B, R)\}$

$|S| = 4$

$|\Sigma| = 2$

$|\text{all 5 tuple}| = 4 \cdot 2 \cdot 4 \cdot 2 \cdot 2$
$= 2^7 = 128$

$|T| = 2^{128}$